minolta XG7

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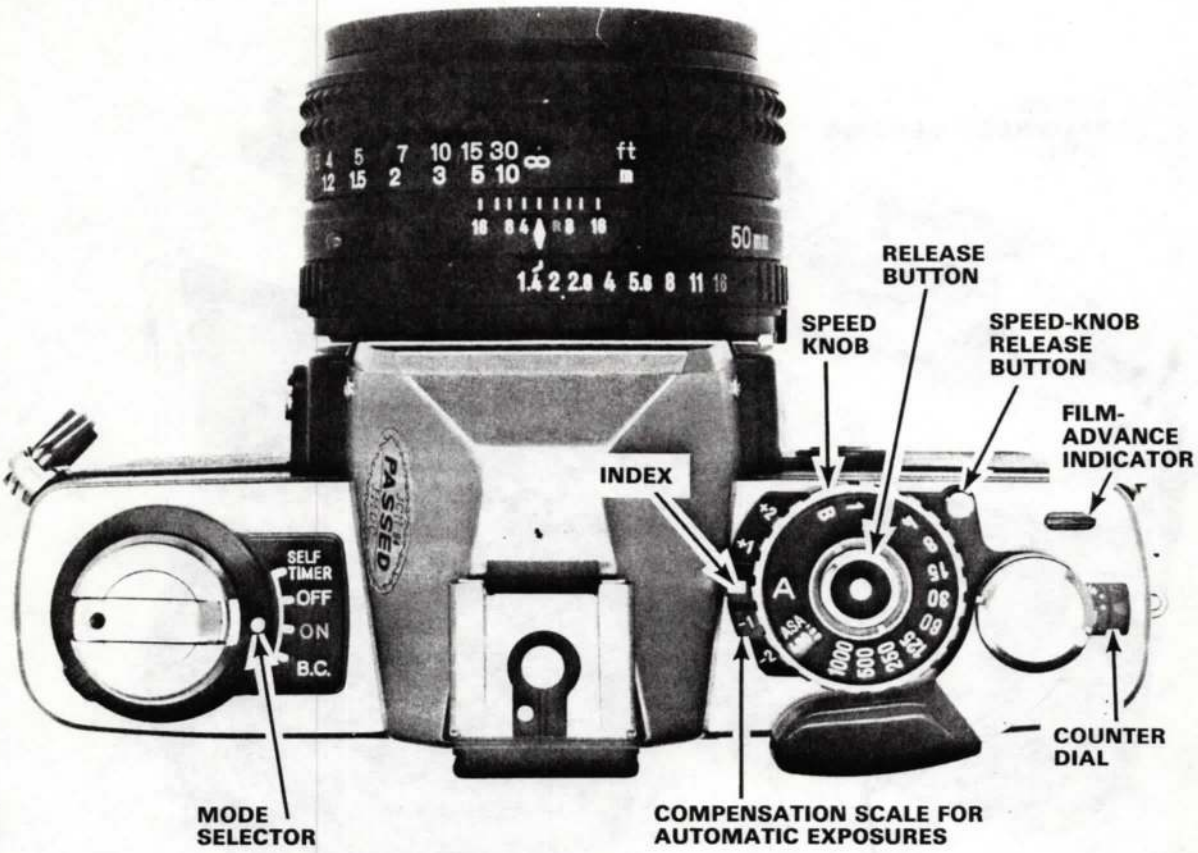
National Camera, Inc.
Technical Training Division
2000 West Union Avenue
Englewood, Colorado 80110



1

At the "A" setting of the speed knob, the XG-7 provides automatic shutter speed control. The speed knob latches at the normal automatic setting shown here. To rotate the speed knob to the other settings, first depress the speed-knob release button. You can get intentional overexposures or underexposures by aligning the "A" calibration with the desired indication on the compensation scale.

To use the camera, first turn the mode selector to the "on" position. The release button has two switches which turn on the metering system. By touching the top surface of the release button, you're closing a "touch" switch; here,your finger serves as one of the switch contacts. The touch switch connects in parallel with the metering switch. Close the metering switch by depressing the release button part way.

Turn the mode selector to the "on" position and set the speed knob to "A." When you then partially depress the release button, the finder LED display indicates which shutter speed the camera will automatically program. Pushing the release button the rest of the way to release the shutter turns off the LED display.

If there's too much light, the overexposure LED turns on. An automatic interlock then prevents the electromagnetic-release system from releasing the shutter. Since the LED display turns off at the manual shutter-speed settings, the shutter will release despite the light conditions.

Page

20 Mode Sw
37 Sv Tv Resistor
35 Av Resistor
24 Change over Sw - A-M
51 Sw 1 + Sw 2
meter Release

2

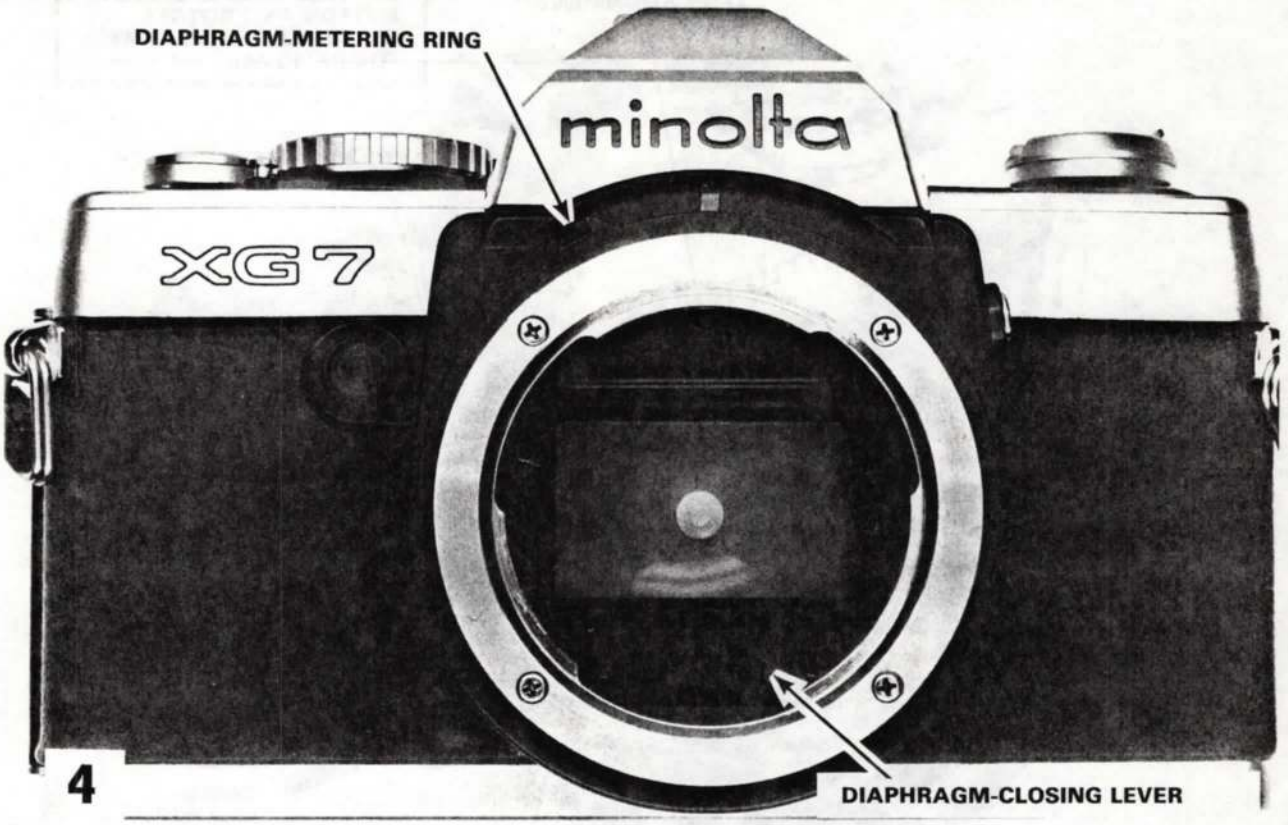
The LED at the front of the camera provides the indicator for the battery-test and self-timer features. Turn the mode selector to the "B.C." ("battery check") position. If the two 1.5-volt silver-oxide batteries are good, the LED glows steadily.

An electronic delay circuit provides the self-timer feature. Turn the mode selector to the "self timer" position. Then depress the release button. The LED flashes on and off during the self-timer delay (around 8 to 12 seconds). Just before the shutter releases, the flashing rate of the LED increases.

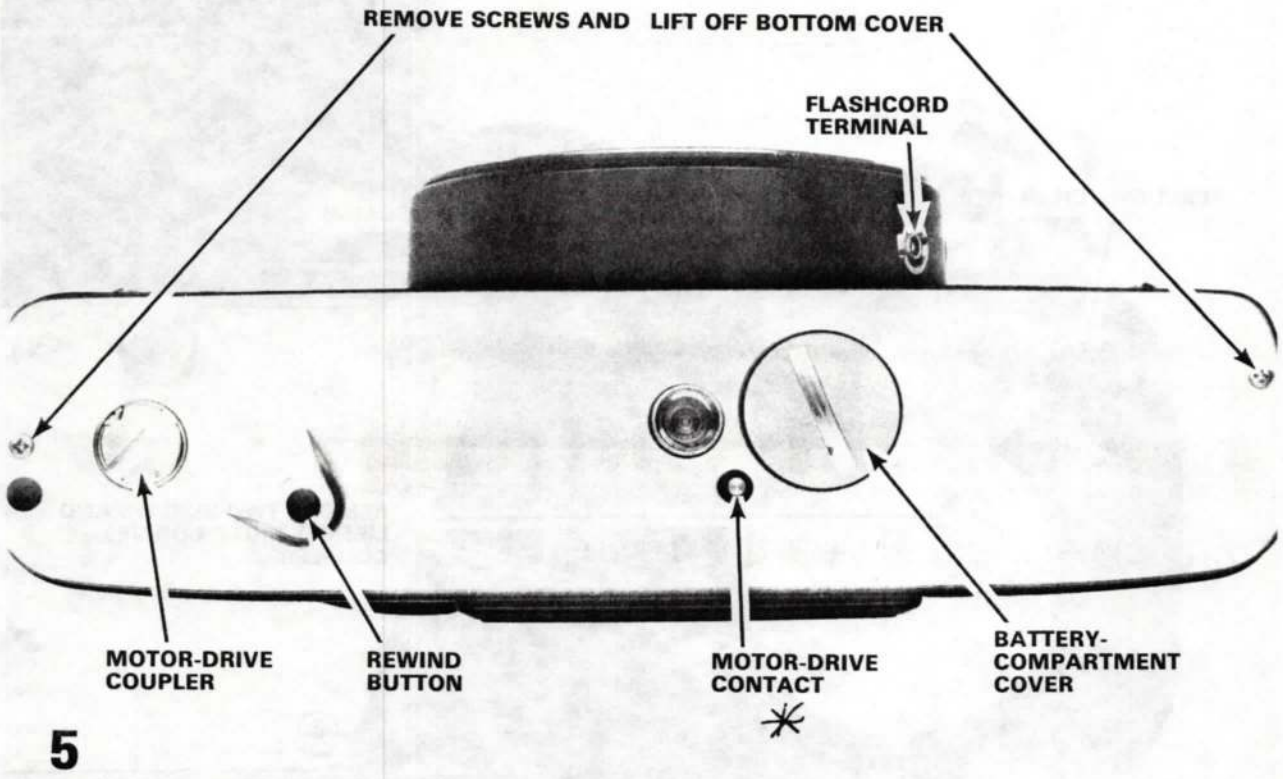
A lug on the diaphragm-setting ring of the MD-type lens comes against the lug on the camera's diaphragm-metering ring. The position of the diaphragm-setting-ring lug programs the camera for the maximum aperture of the particular lens and for the f/stop setting. As you rotate the diaphragm-setting ring to the smaller apertures, the diaphragm-metering ring turns clockwise.

3

A remote-release accessory screws into the cable-release socket. The switch in the cable-release socket connects in parallel with the release-button switch. Shorting between the contact in the center of the cable-release socket and ground (the edge of the socket) should release the shutter.



resistor cleaned when ring is pulled

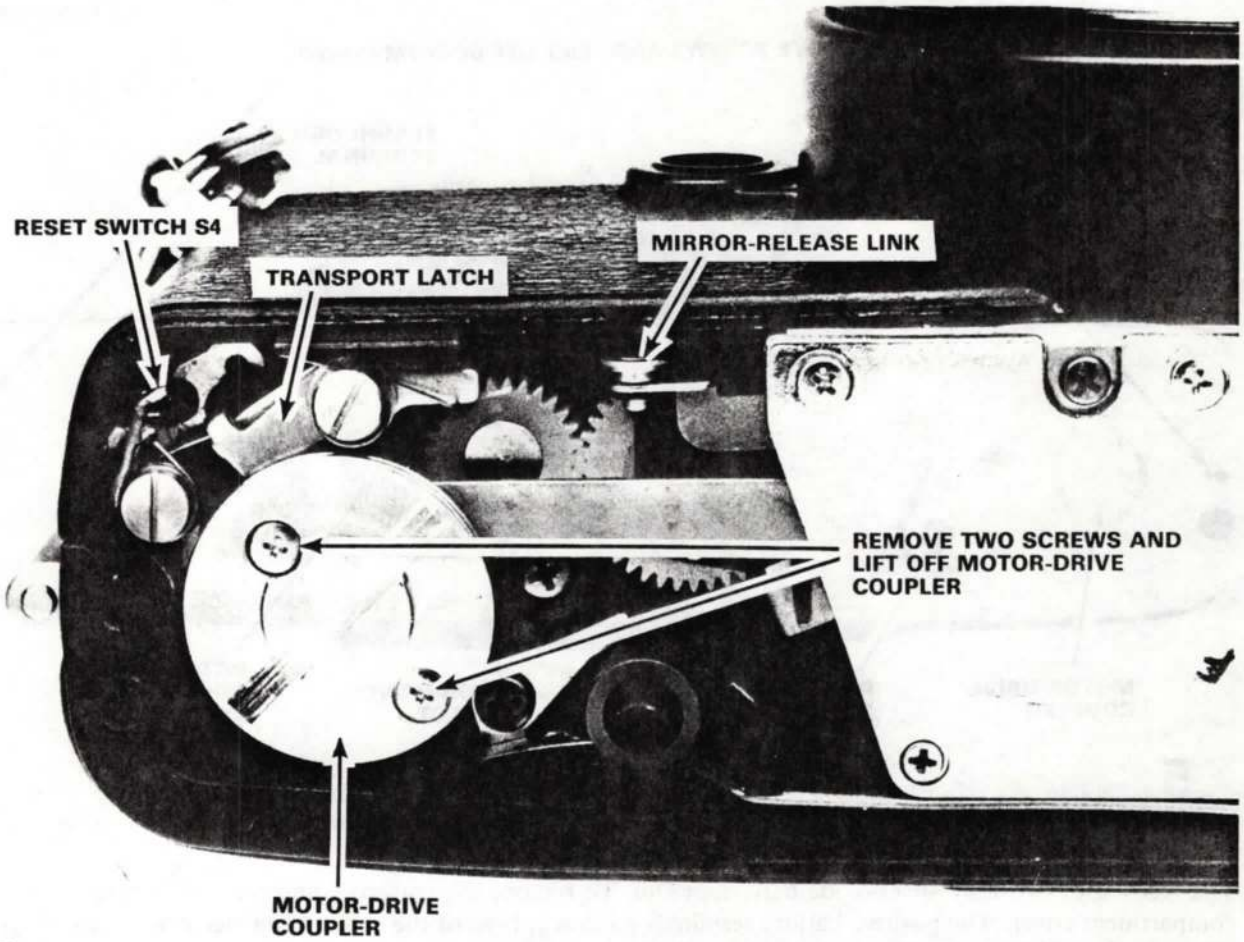


5

The XG-7 uses two 1.5V silver-oxide batteries (S76). To remove the batteries, unscrew the battery-compartment cover. The positive battery terminals go down, toward the camera; the negative terminals go up, toward the battery-compartment cover, and connect to ground. You do not have to remove the battery-compartment cover to take off the camera's bottom cover.

* between Motor drive Contact and ground

3 ✓ Off
0 ✓ Released
2 ✓ cocked



6

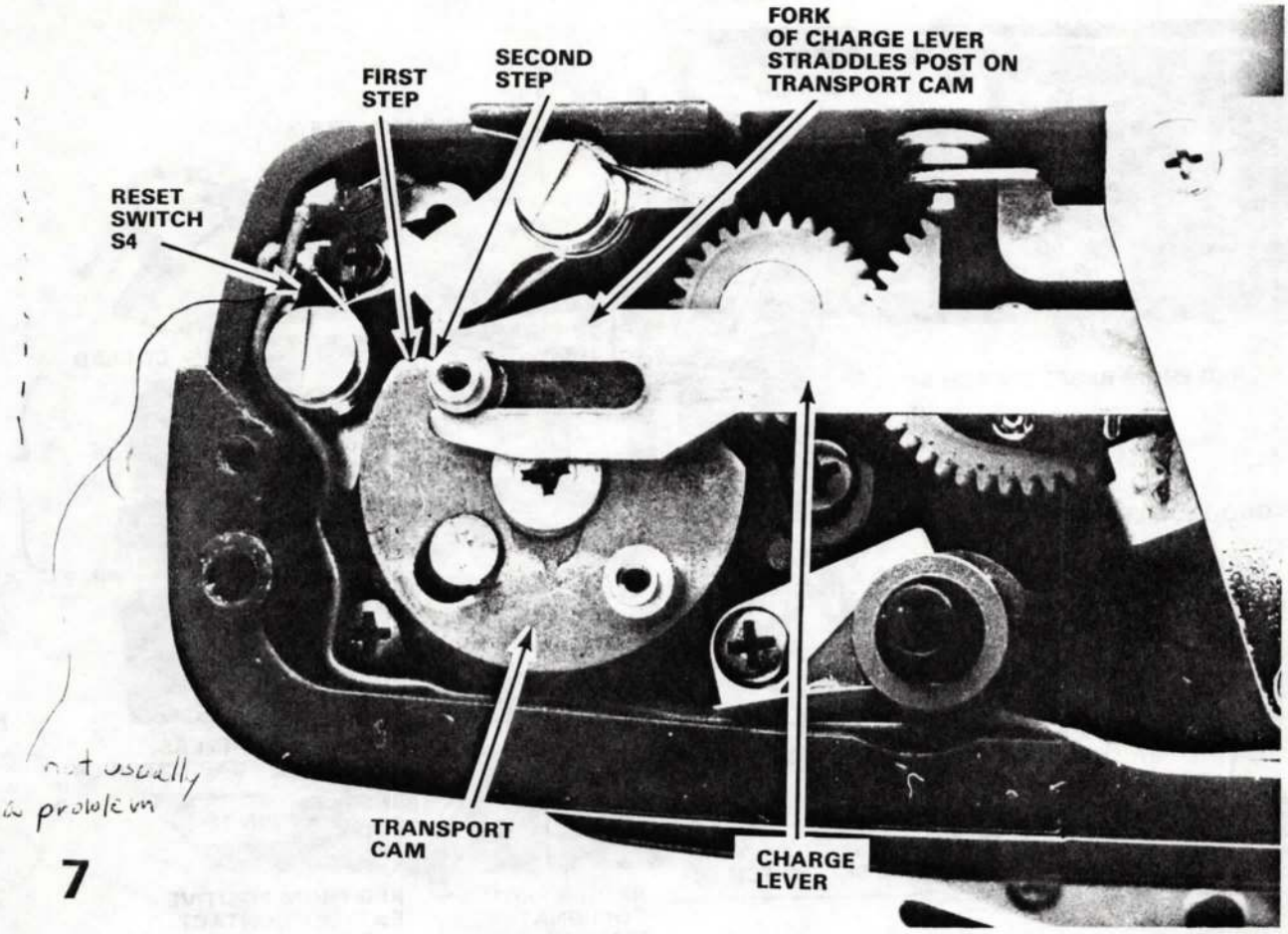
If the mirror fails to release when you depress the release button, try manually releasing the mirror -- push the mirror-release link from left to right. You're now simulating the action of the combination magnet Mg2. If the mirror fails to release when you actuate the mirror-release link, the problem is mechanical.

otherwise its electrical

The reset switch S4 closes when the shutter is cocked; it opens when the shutter is in the released position. S4 resets the circuit and prevents misoperation during the wind cycle. But it also controls the signal at the motor-drive contact. With S4 open, there's no voltage appearing between the motor-drive contact and ground. The absence of a signal tells the motor drive to operate. But, when S4 closes, a 2V signal appears at the motor-drive contact. The voltage signal stops the motor-drive unit.

If the reset switch is defective, the shutter won't release electronically. To check the reset switch, first remove the motor-drive coupler shown here.

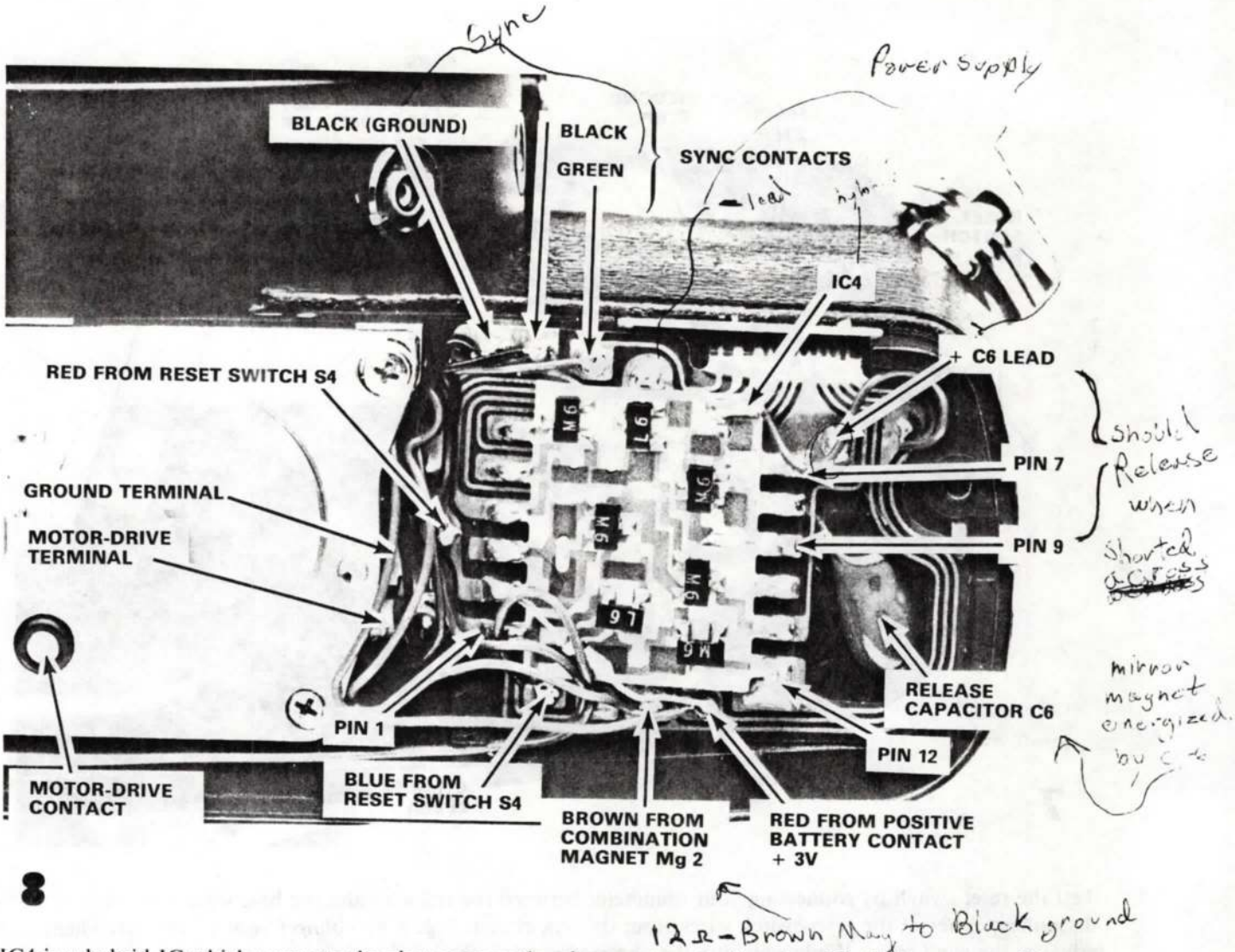
applys to AE-I



7

Test the reset switch by connecting your ohmmeter between the red wire and the blue wire; you can disconnect either of the reset-switch wires from the flex circuit, Fig. 8, to connect your ohmmeter. Then, advance the wind lever. While watching the ohmmeter, allow the wind lever to return slowly to its rest position.

The reset switch S4 should remain off as the transport latch engages the first step in the transport cam. But the reset switch should close when the transport latch engages the second step in the transport cam. When you release the shutter, the reset switch should once again open. If the timing of the reset switch is not correct, you'll have to reform the switch contacts.

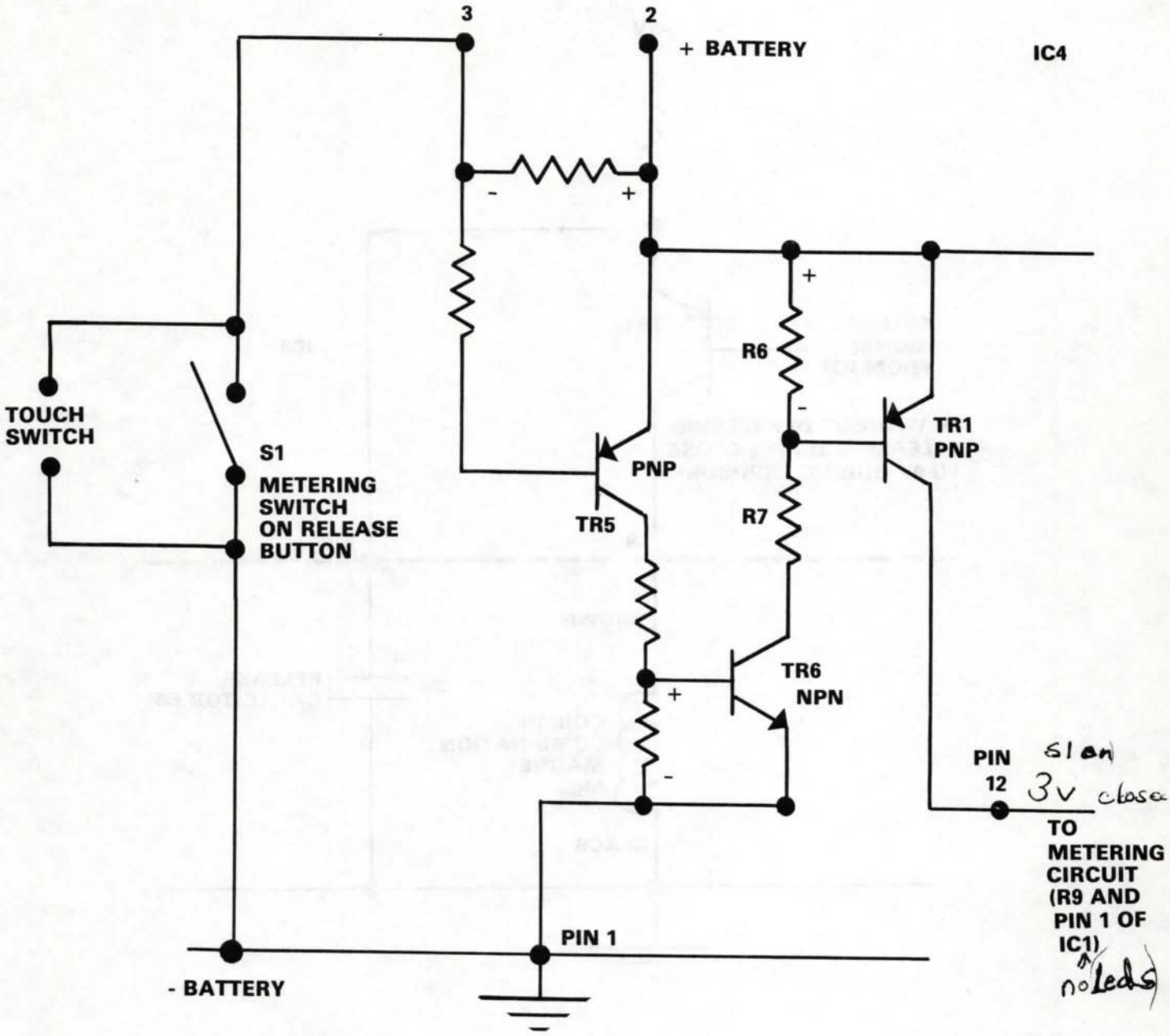


IC4 is a hybrid IC which connects the electromagnetic-release system to the other ICs in the camera. The release capacitor C6 charges to the full battery voltage. When you push the release button, C6 discharges through the coil of a combination magnet (permanent magnet plus electromagnet). The combination magnet then repels its armature to release the mirror.

Although you can't as yet see the combination magnet Mg2, you can test the release action. Cock the shutter. Then use your tweezers to short between the release capacitor and IC4 -- between the positive capacitor lead and pin 9 of the IC. The mirror should release, regardless of the mode-switch position. If the mirror fails to release, the problem is most likely with the release capacitor or with the combination magnet. Check the continuity of the combination-magnet coil between the black wire (ground) and the brown wire shown here.

You can also check the X-sync contacts. Disconnect the green wire shown here. Connect your ohmmeter between the green wire and ground; the ohmmeter is now across the X-sync contacts. The X-sync contacts should close when the opening curtain crosses the focal-plane aperture; they should open when the closing curtain crosses the aperture.

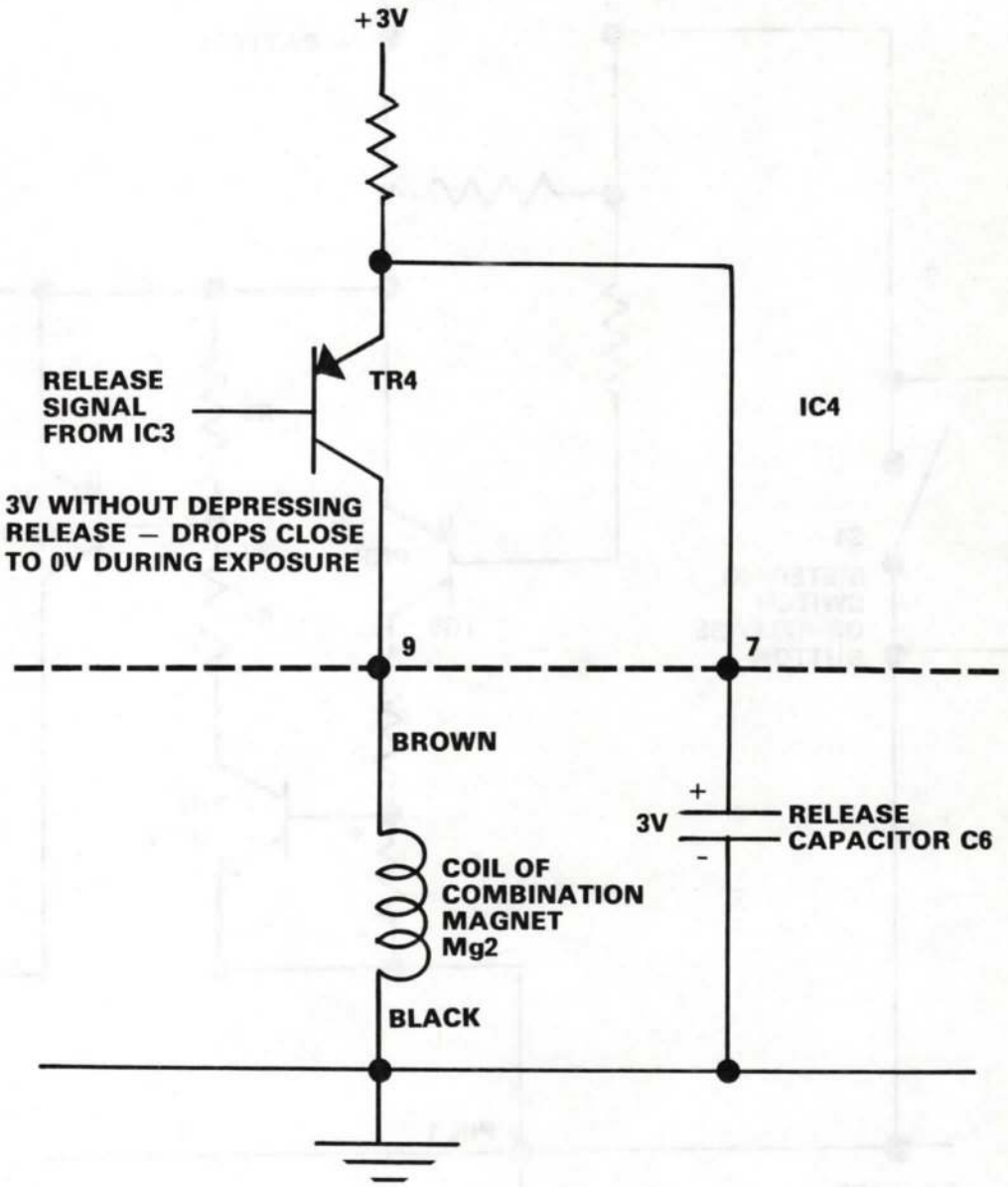
Later models have only one black wire at the flex-circuit ground contact. The black wire comes from the combination magnet. Since the X-sync contacts have sufficient ground to the camera body, the second black wire has been eliminated.



09

Closing the metering switch S1 by partially depressing the release button supplies the forward bias that turns on transistor TR5. TR5 then turns on TR6, and TR6 turns on TR1 which connects to pin 12 of IC4. When TR1 turns on, it supplies battery power to the metering circuit and to the timing circuit.

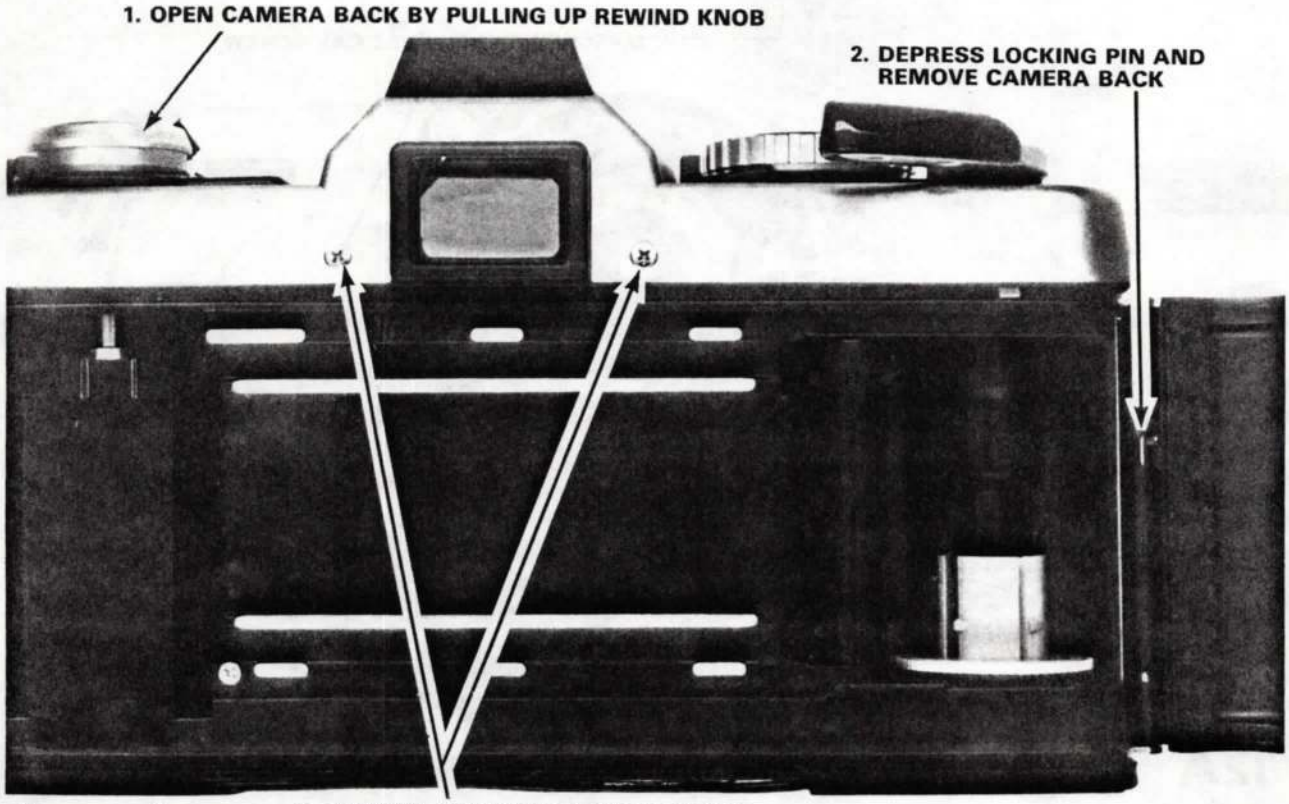
Suspect a problem in this portion of the circuit if the LED display fails to operate and the shutter hangs open. Check then to see if you're getting around 3 volts at pin 12 of IC4 as you start depressing the release button. If you're not getting this voltage, the problem could be with IC4 or with the metering switch S1. Check the metering switch by shorting between pins 1 and 3 of IC4; the LED display should turn on. If your shorting test turns on the LED display, the problem is probably with the metering switch S1.



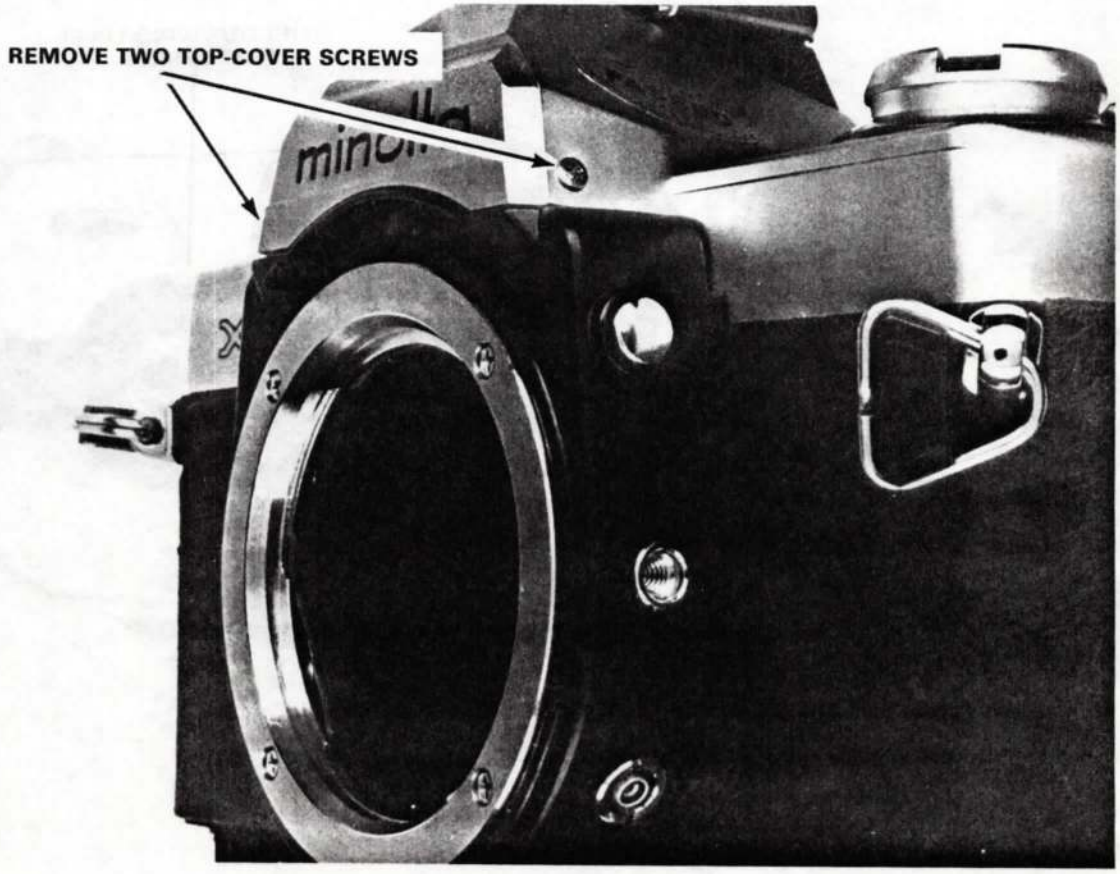
10

When you depress the release button far enough to close the release switch S2, the release circuit turns on transistor TR4. The release capacitor C6 then discharges through TR4 and through the coil of the combination magnet Mg2. The combination magnet Mg2 now repels its armature, thereby releasing the mirror.

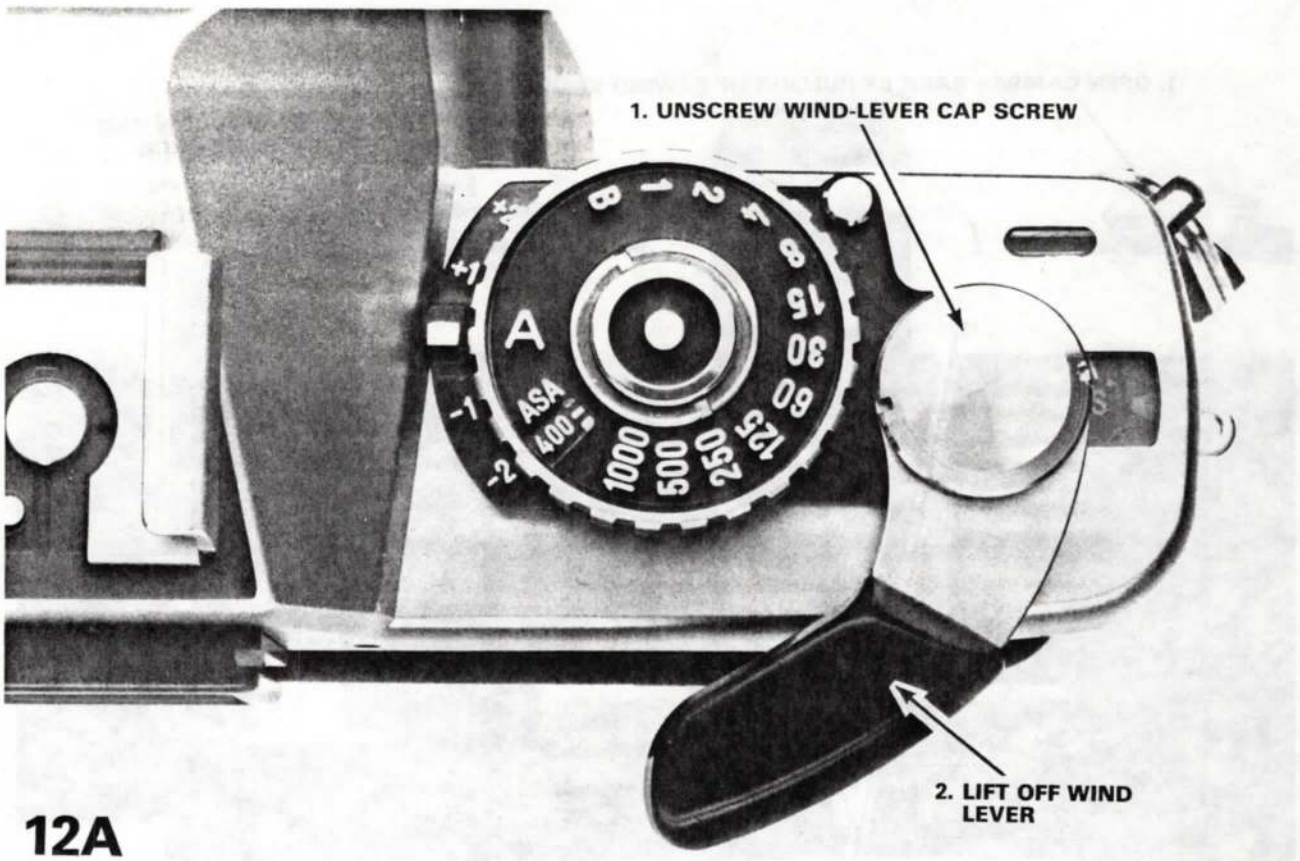
Turning on TR4 simultaneously locks in the memory voltage. The control system then remembers the exposure conditions even though the mirror is rising. The memory circuit is at the top of the camera.


1. OPEN CAMERA BACK BY PULLING UP REWIND KNOB
2. DEPRESS LOCKING PIN AND REMOVE CAMERA BACK
3. REMOVE LONG TOP-COVER SCREWS

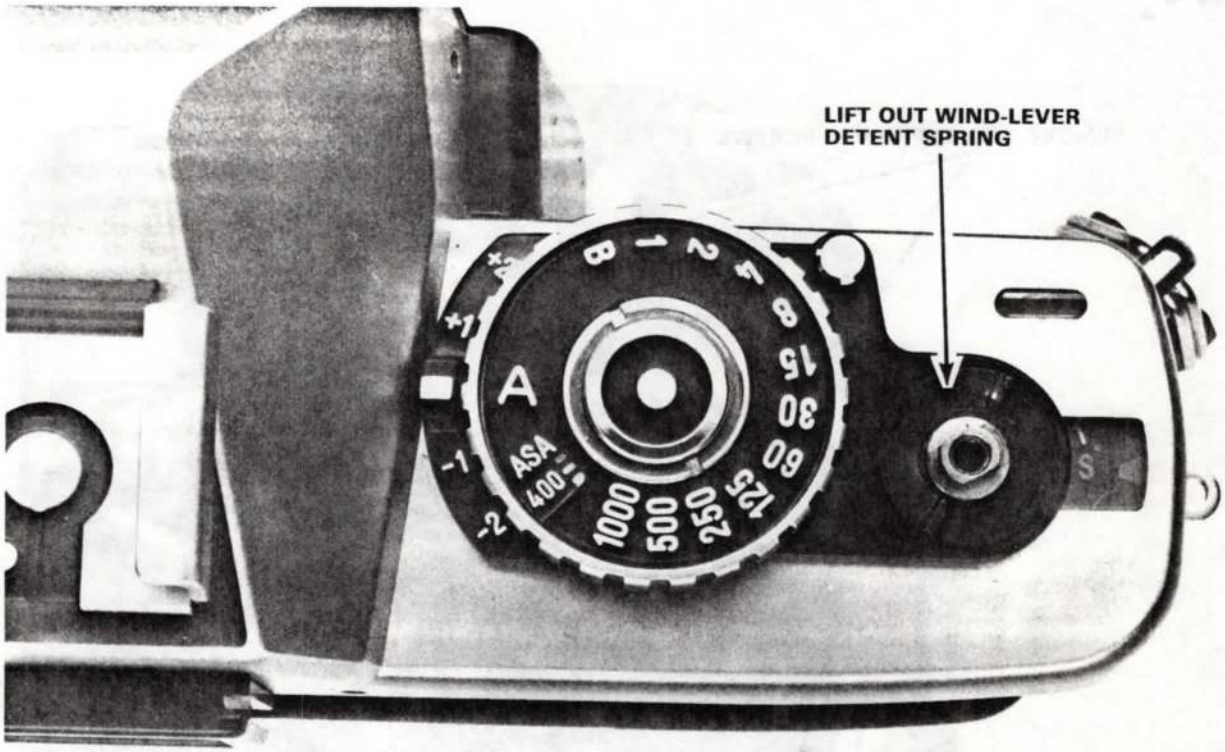
11A


REMOVE TWO TOP-COVER SCREWS

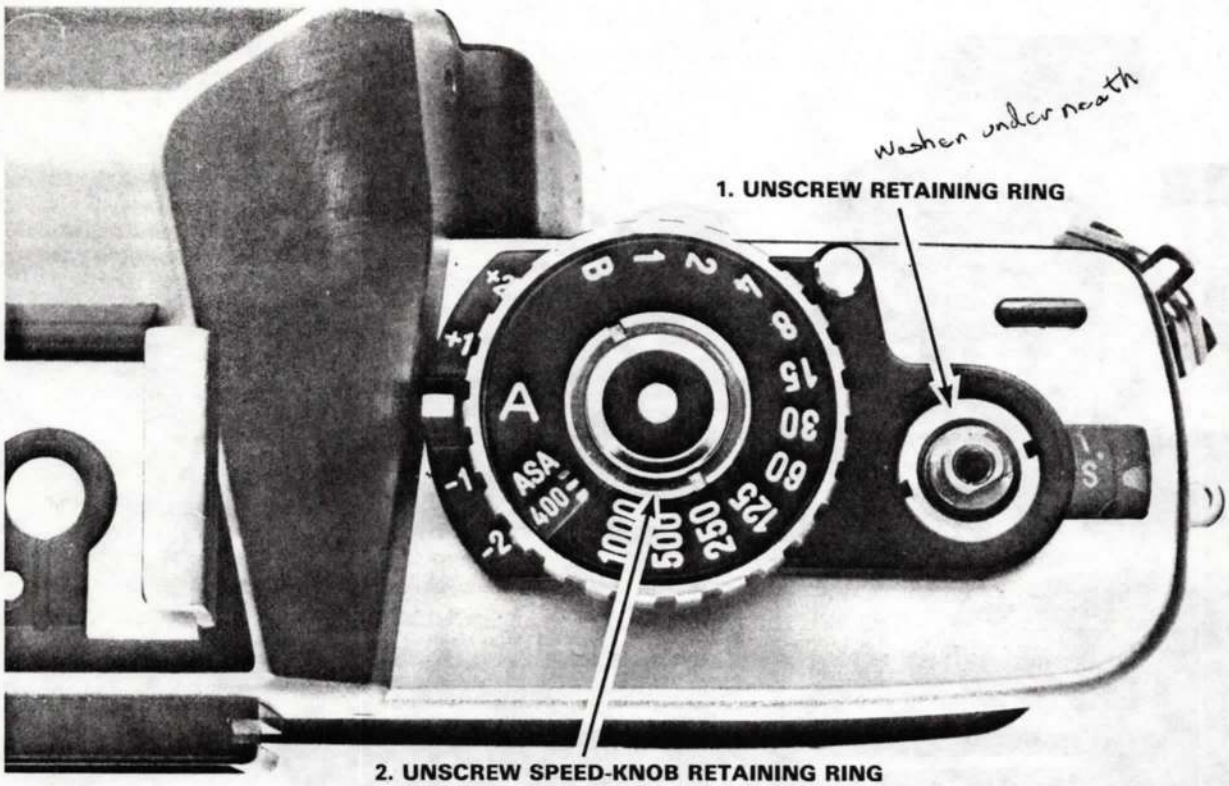
11B


1. UNSCREW WIND-LEVER CAP SCREW
2. LIFT OFF WIND LEVER
A
ASA
400
1000
500
250
125
60
30
15
8
4
2
1
-1
-2
+1

12A

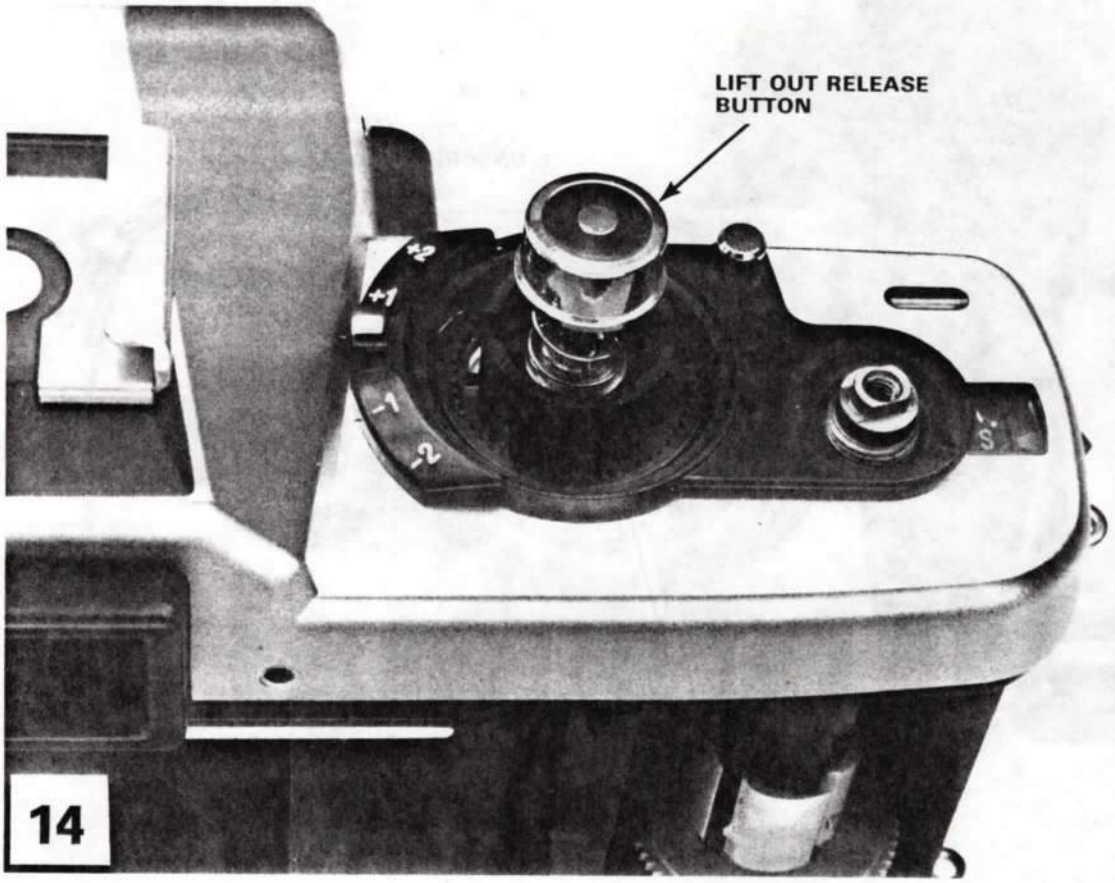

LIFT OUT WIND-LEVER DETENT SPRING
A
ASA
400
1000
500
250
125
60
30
15
8
4
2
1
-1
-2
+1

12B

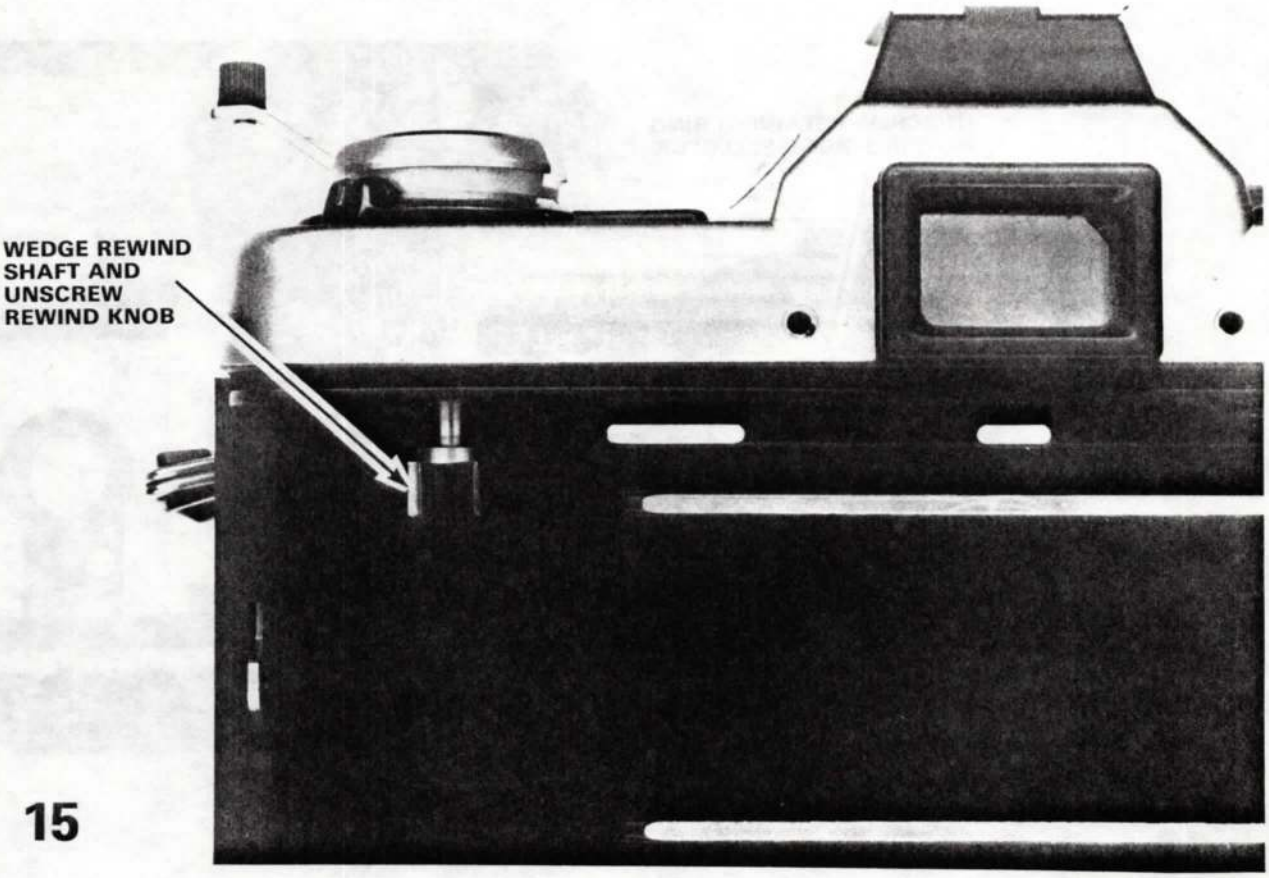


2. UNSCREW SPEED-KNOB RETAINING RING

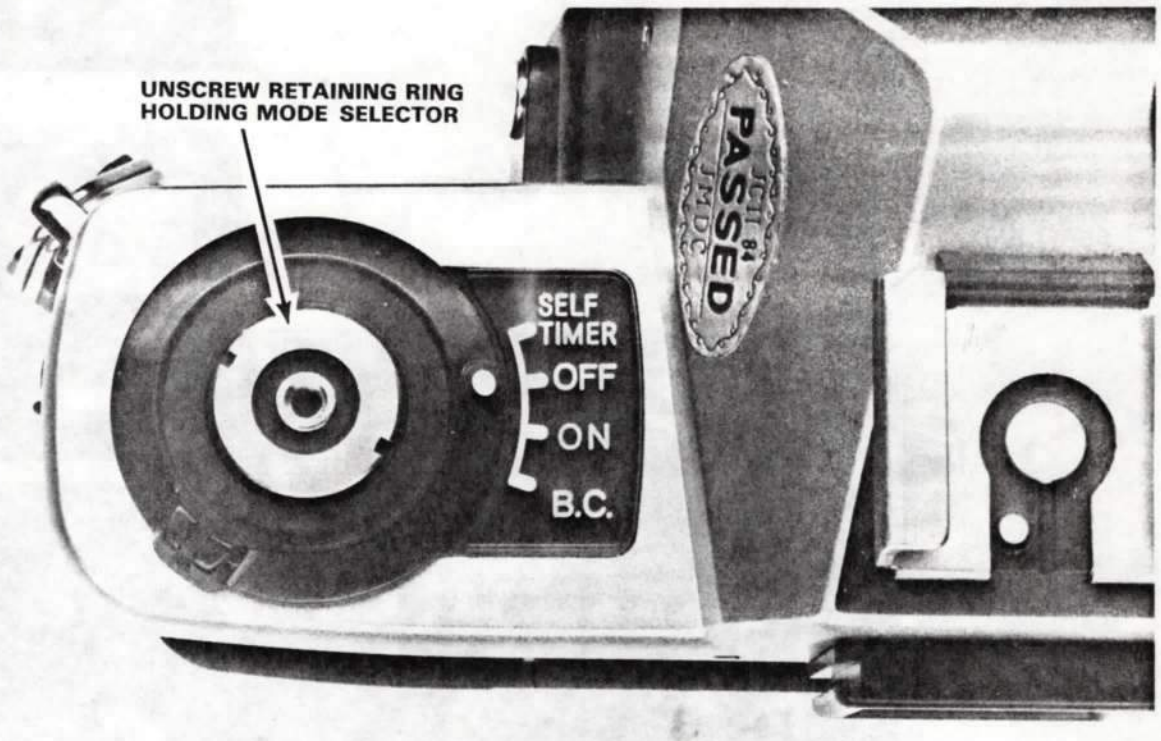
3. LIFT OFF SPEED-KNOB ASSEMBLY



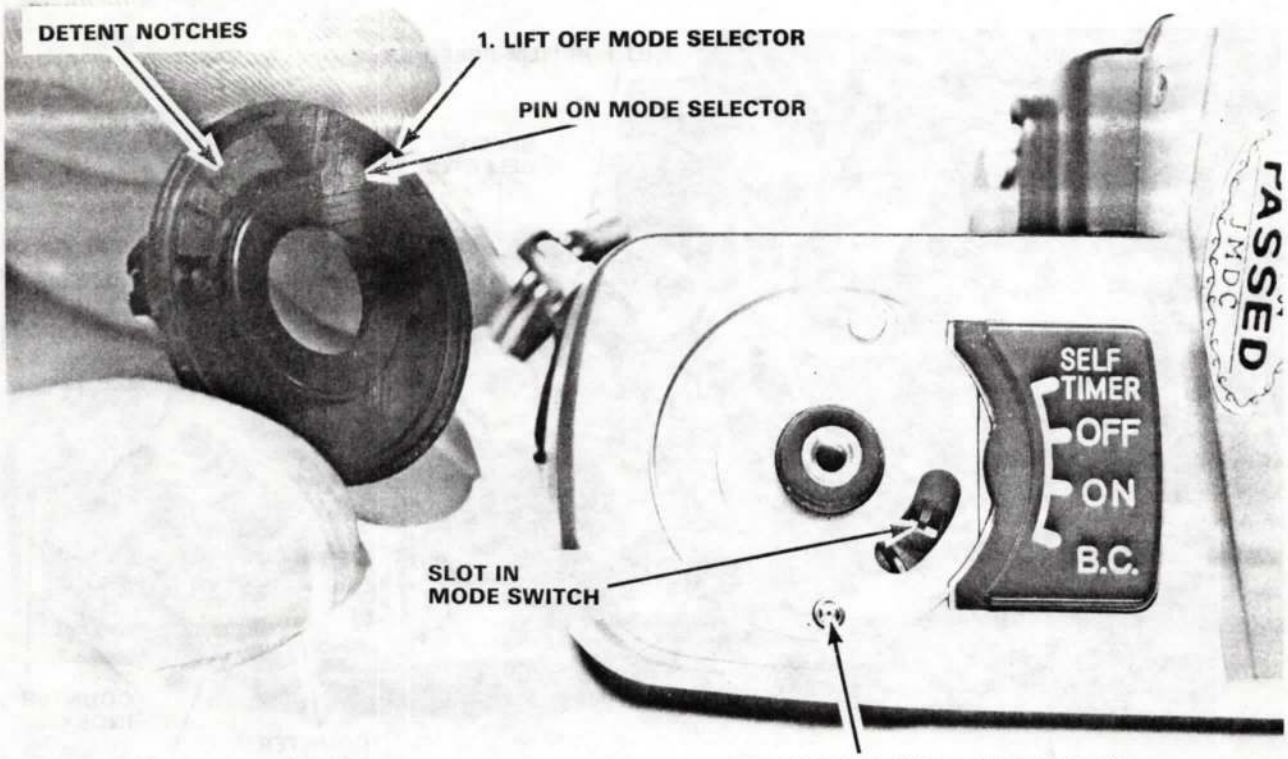
14



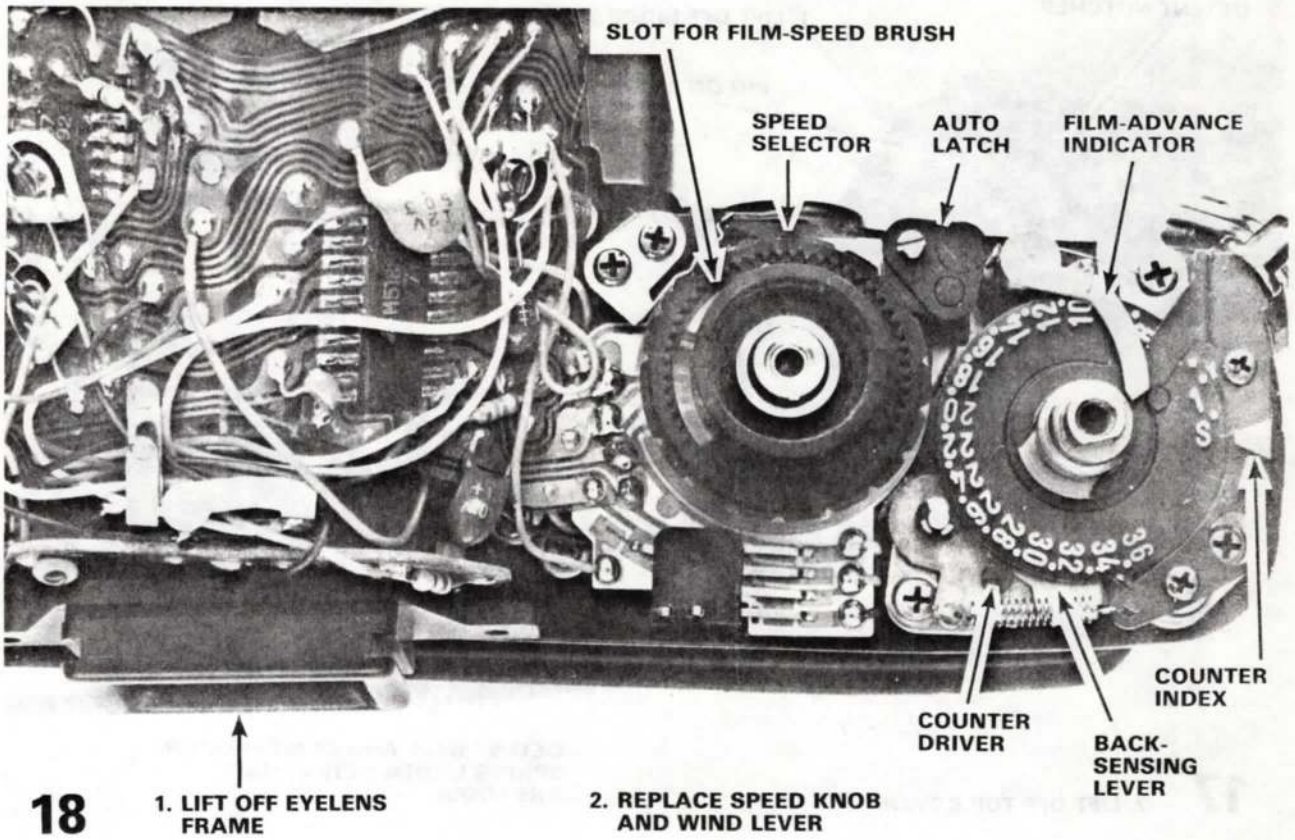
15


UNSCREW RETAINING RING
HOLDING MODE SELECTOR
SELF
TIMER
OFF
ON
B.C.
PASSED
TCII 84
JMDC

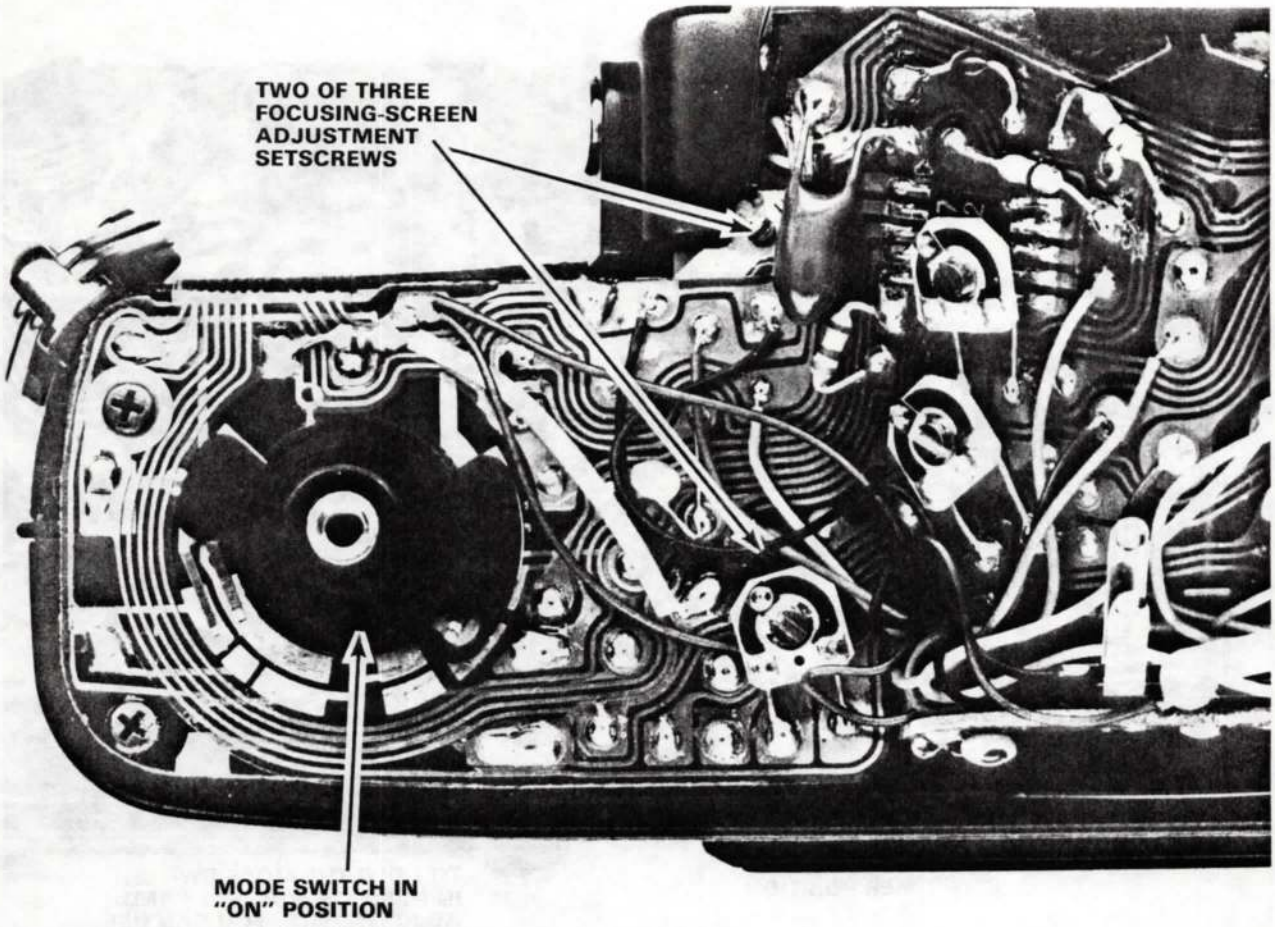
16



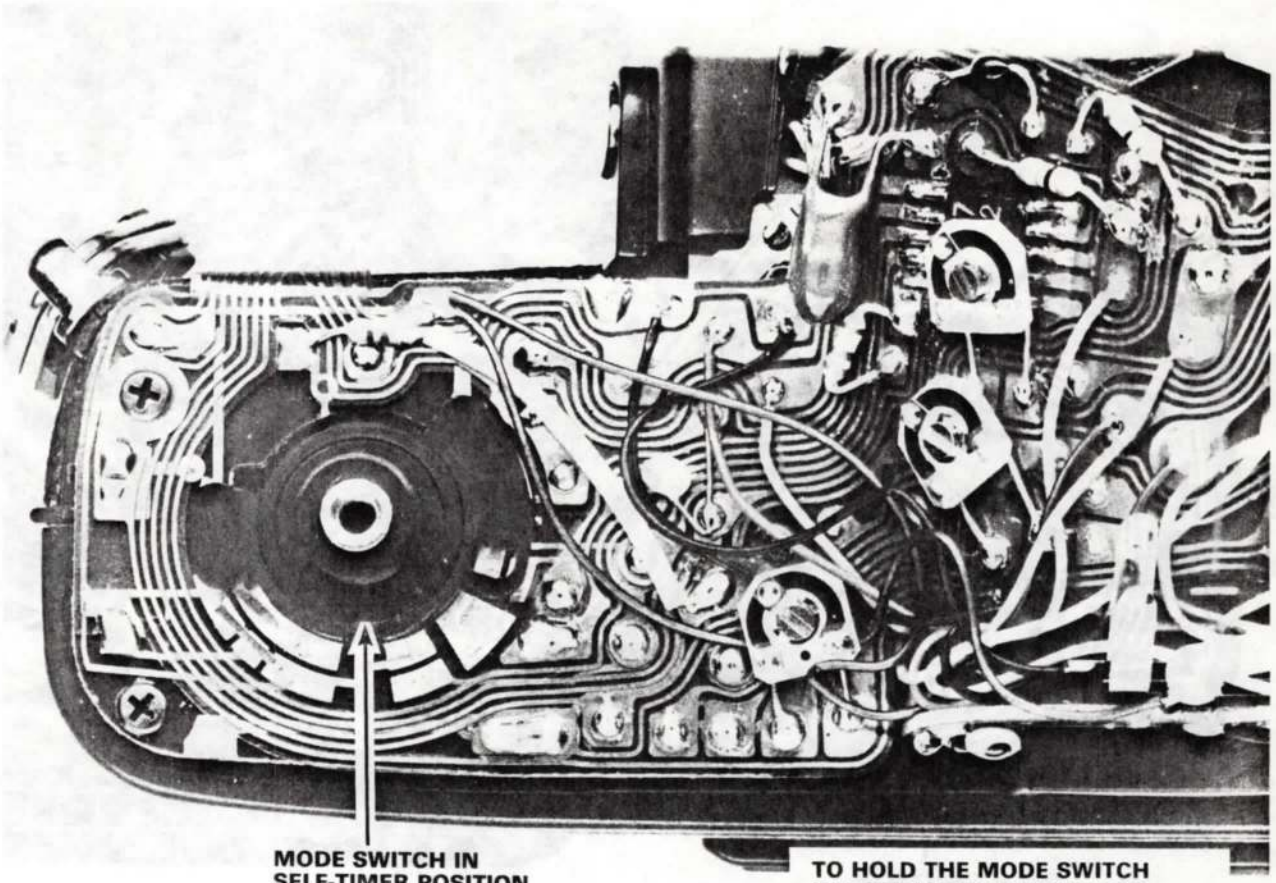
17 2. LIFT OFF TOP COVER



When you push in the back-sensing lever, the counter driver should move into the first tooth slot of the counter gear (the gear under the counter dial). The counter driver then picks up and turns the counter gear as you advance the wind lever. If the counter driver doesn't engage the tooth slot, loosen the two screws and shift the position of the counter index.


TWO OF THREE
FOCUSING-SCREEN
ADJUSTMENT
SETSCREWS
MODE SWITCH IN
"ON" POSITION

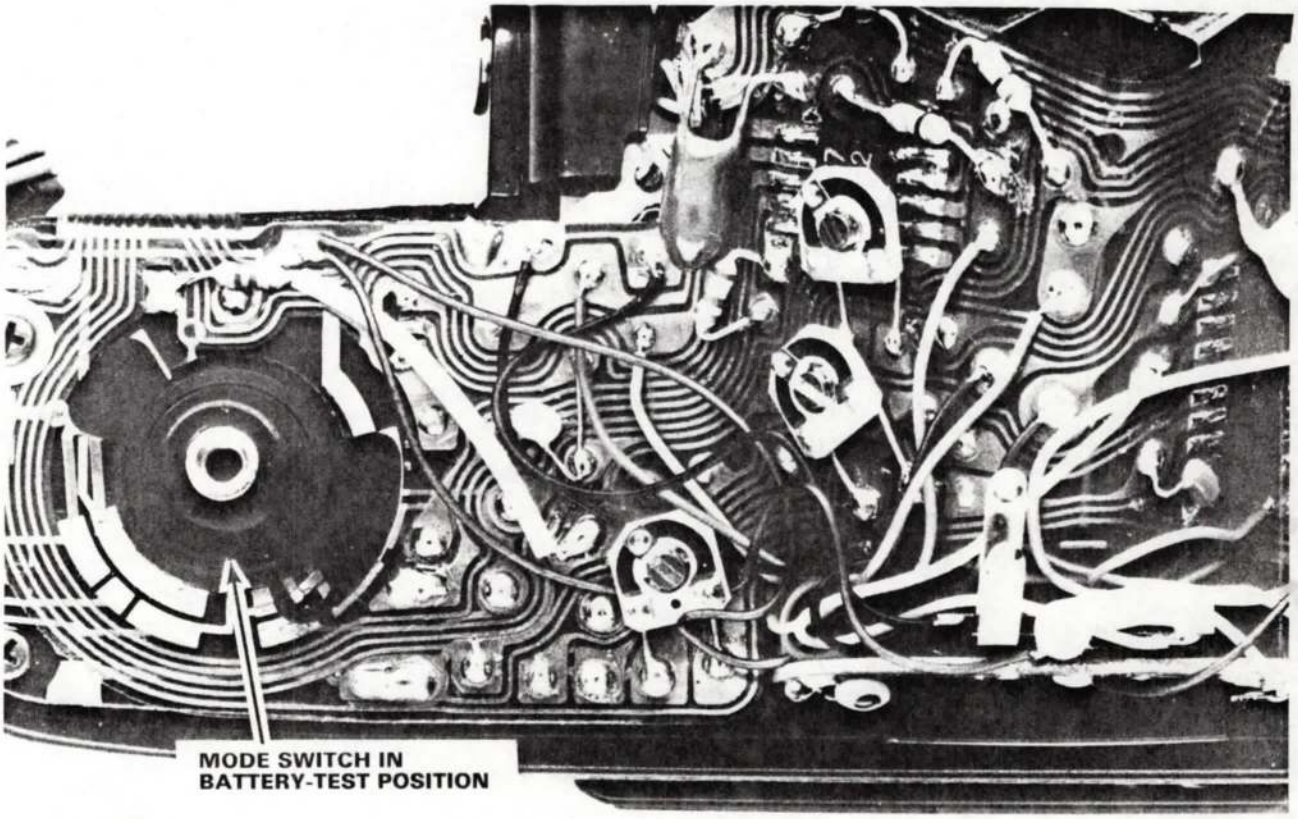
19



MODE SWITCH IN
SELF-TIMER POSITION

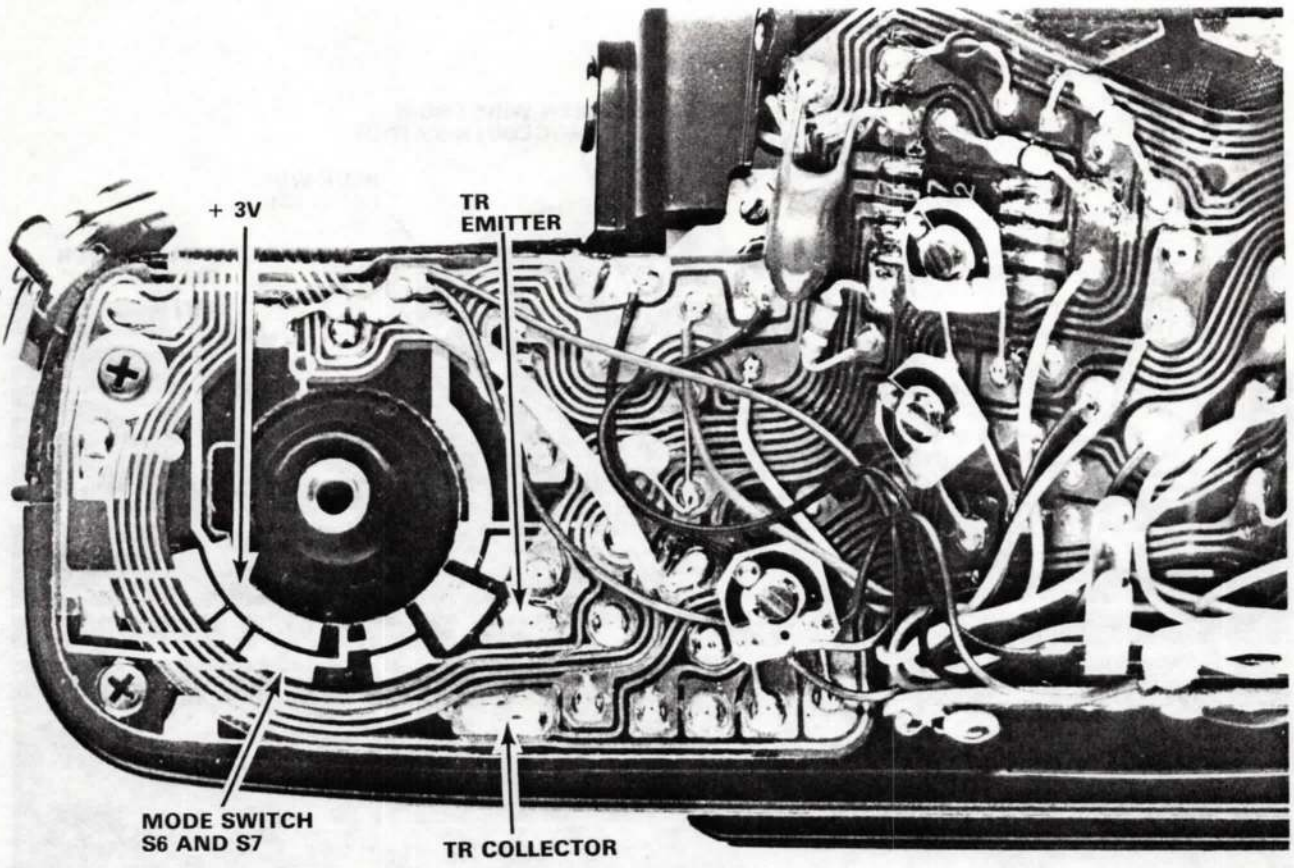
TO HOLD THE MODE SWITCH IN POSITION FOR TESTS AND ADJUSTMENTS, YOU CAN USE THE MODE-SELECTOR RETAINING RING. TURN THE RETAINING RING UPSIDE DOWN AND SCREW IT ON TOP OF THE MODE SWITCH

20A

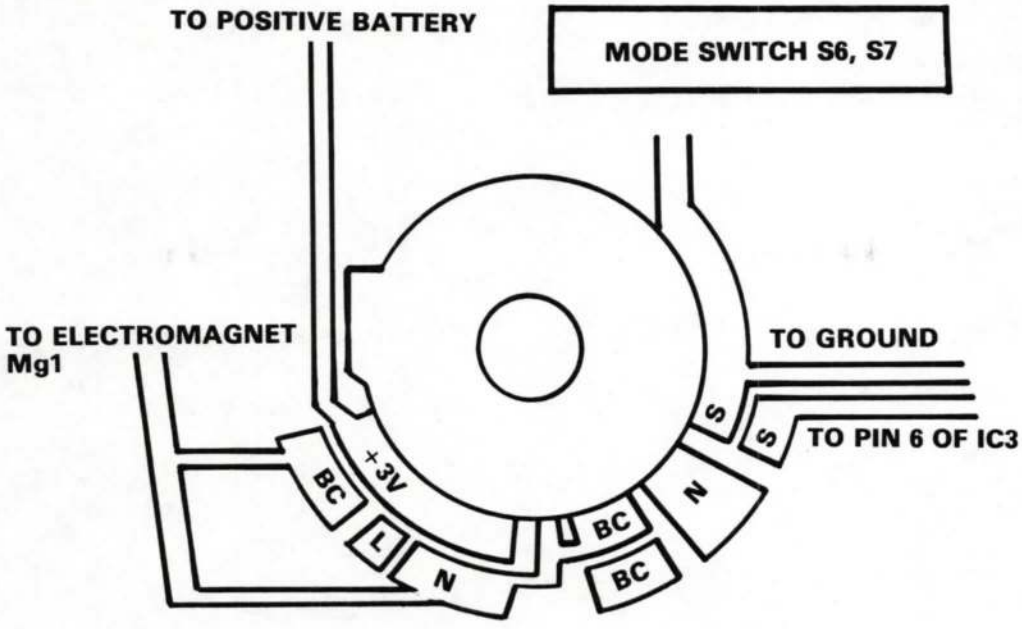


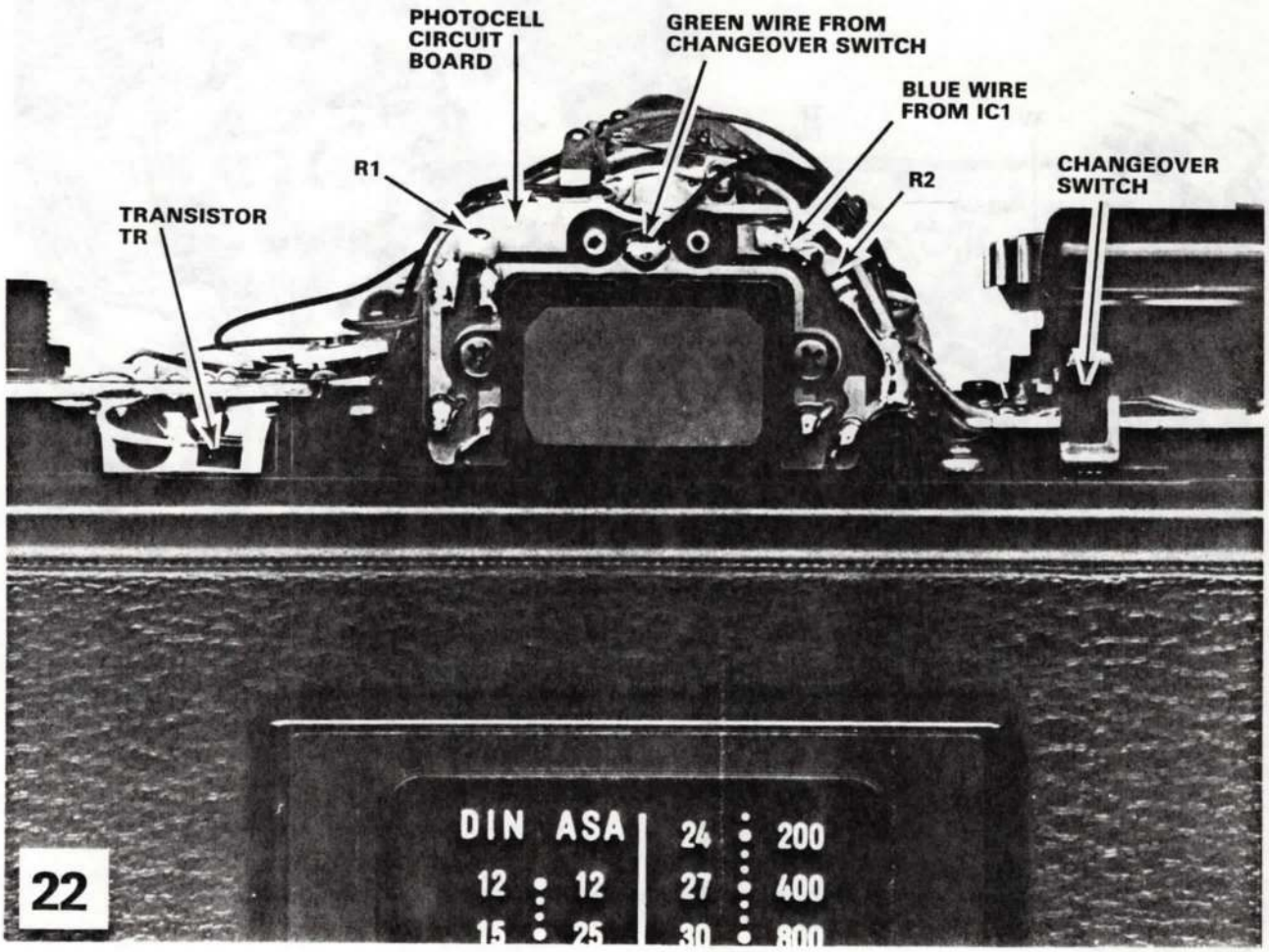
MODE SWITCH IN
BATTERY-TEST POSITION

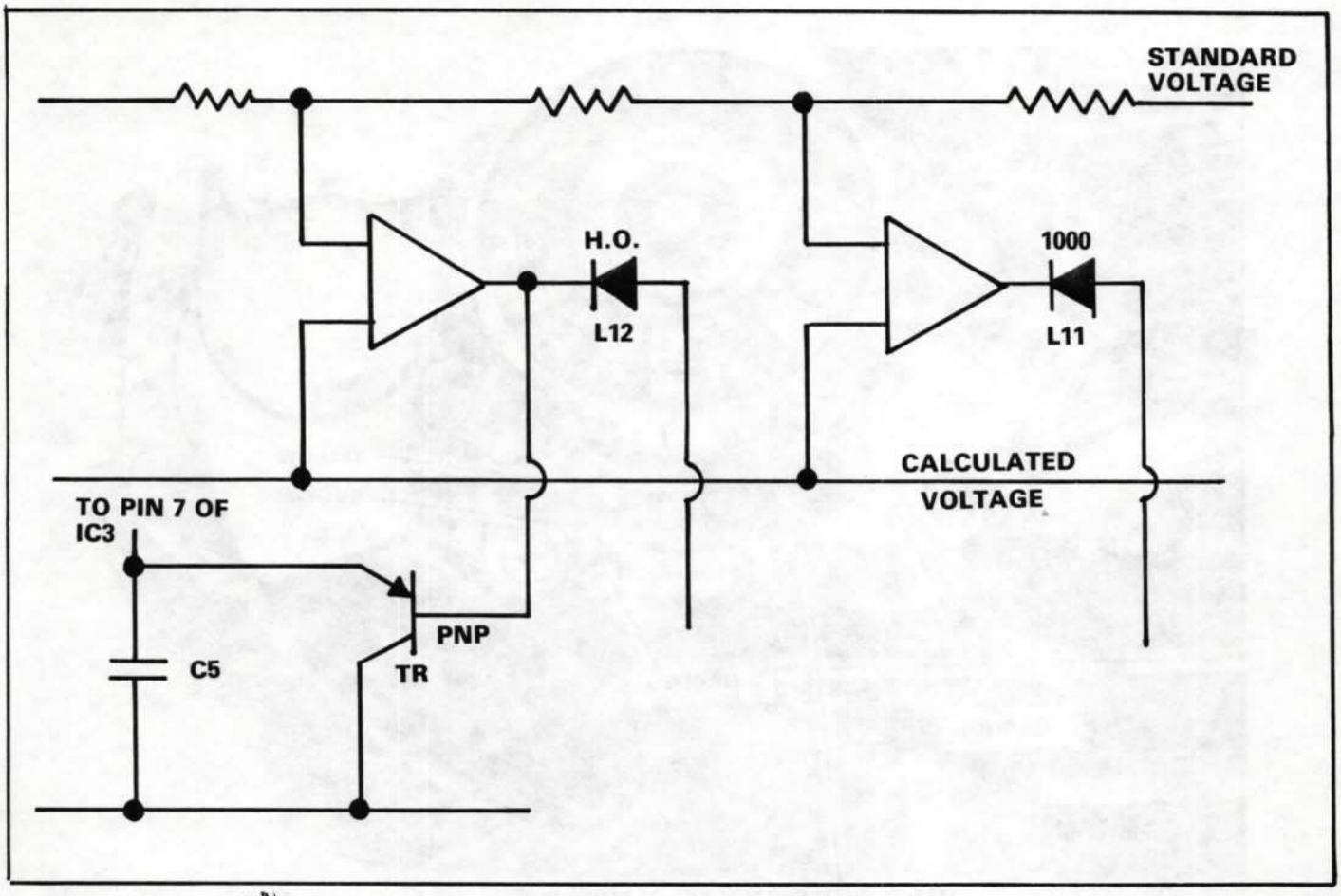
20B


+ 3V
TR
EMITTER
MODE SWITCH
S6 AND S7
TR COLLECTOR

21


TO POSITIVE BATTERY
MODE SWITCH S6, S7
TO ELECTROMAGNET
Mg1
TO GROUND
TO PIN 6 OF IC3
+3V
BC
L
N
BC
BC
N
S
S

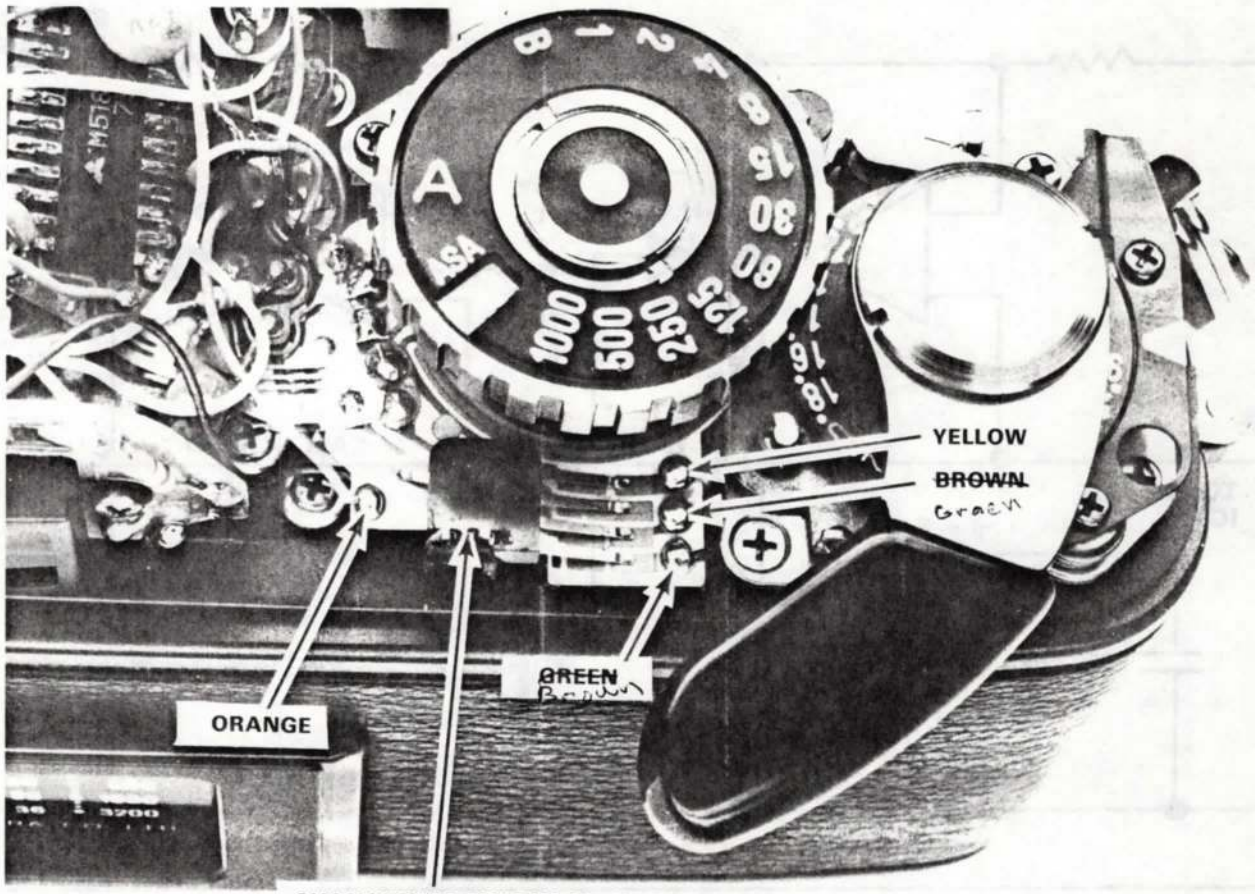

PHOTOCELL CIRCUIT BOARD
GREEN WIRE FROM CHANGEOVER SWITCH
BLUE WIRE FROM IC1
R1
R2
CHANGEOVER SWITCH
TRANSISTOR TR
DIN ASA
12 12
15 25
24 200
27 400
30 800
22



23 Over range turns on Camera should lockup

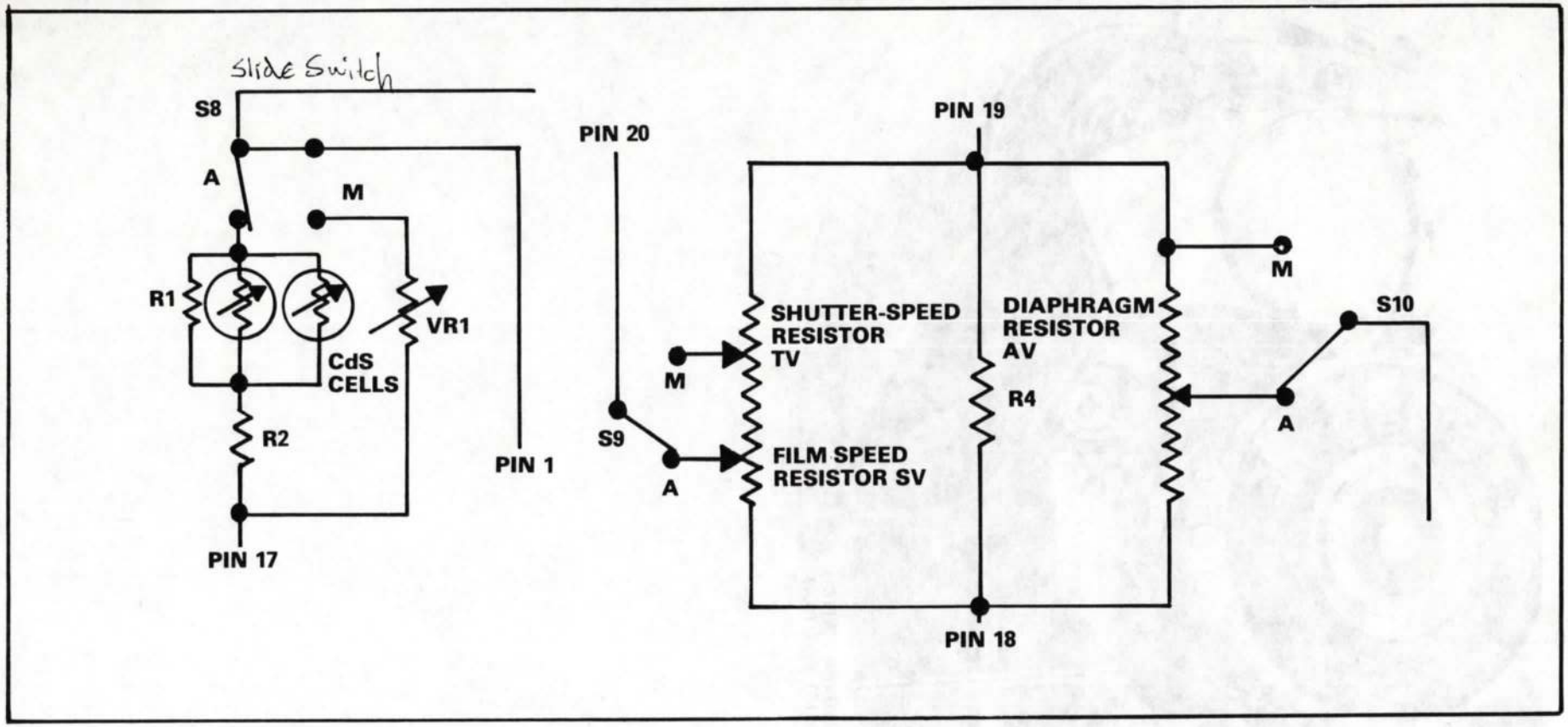
The LED circuit consists of a series of comparators in IC2. A standard voltage applied at one input of each comparator is divided by a series of resistors. Each comparator then has a different reference voltage. The reference voltage is compared to the calculated voltage at the second input of each comparator. When the two voltages are close to one another at a particular comparator, that comparator turns on and lights its LED.

L12, the overrange LED, also controls the release lock for too high a light level. When you push the release button, capacitor C5 quickly charges to the voltage which allows the shutter to release. However, if the overrange LED is conducting, it turns on the switching transistor TR. TR then shorts across C5, preventing the capacitor from reaching the voltage which allows the release capacitor to discharge.



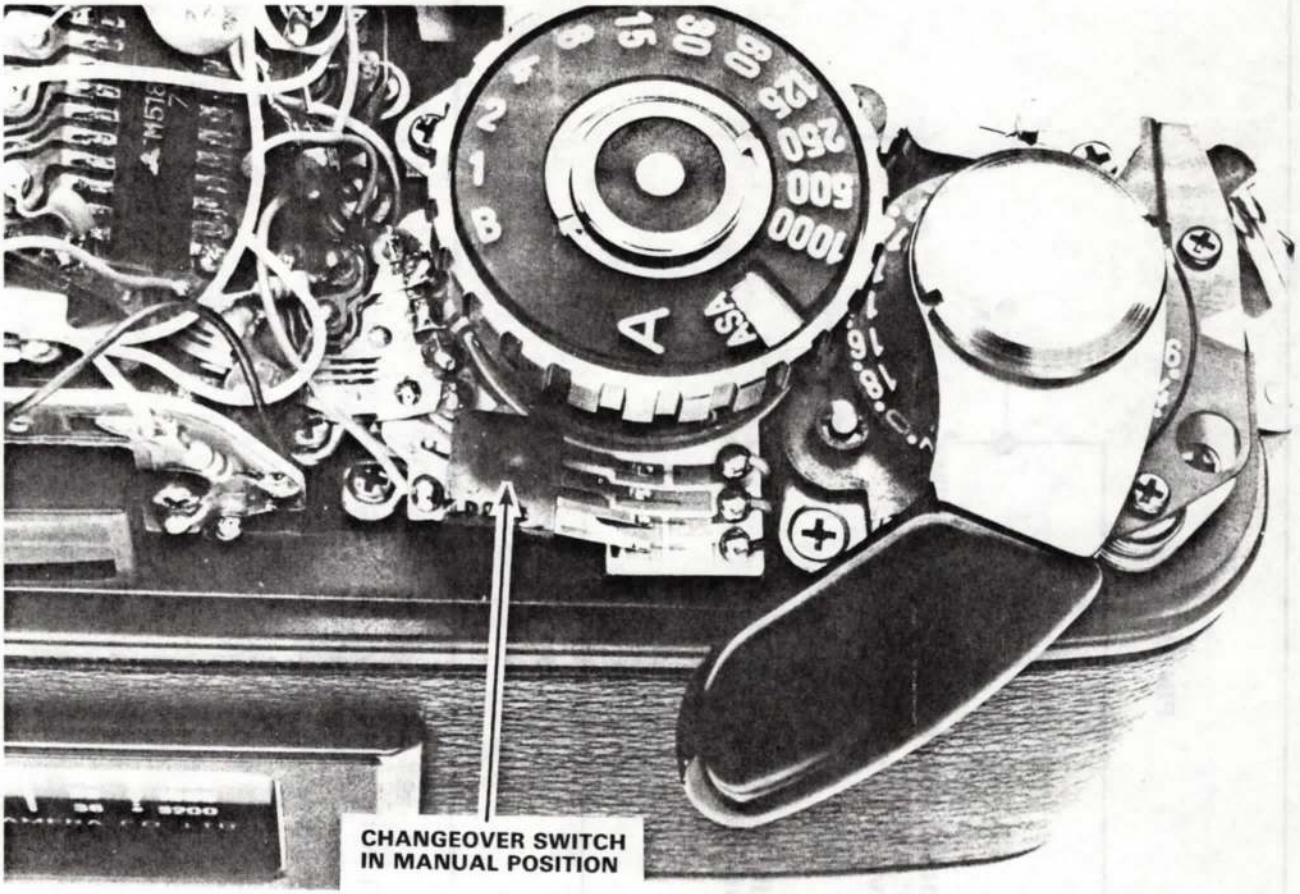
CHANGEOVER SWITCH S8, S9, AND S10
IN AUTOMATIC POSITION

24A

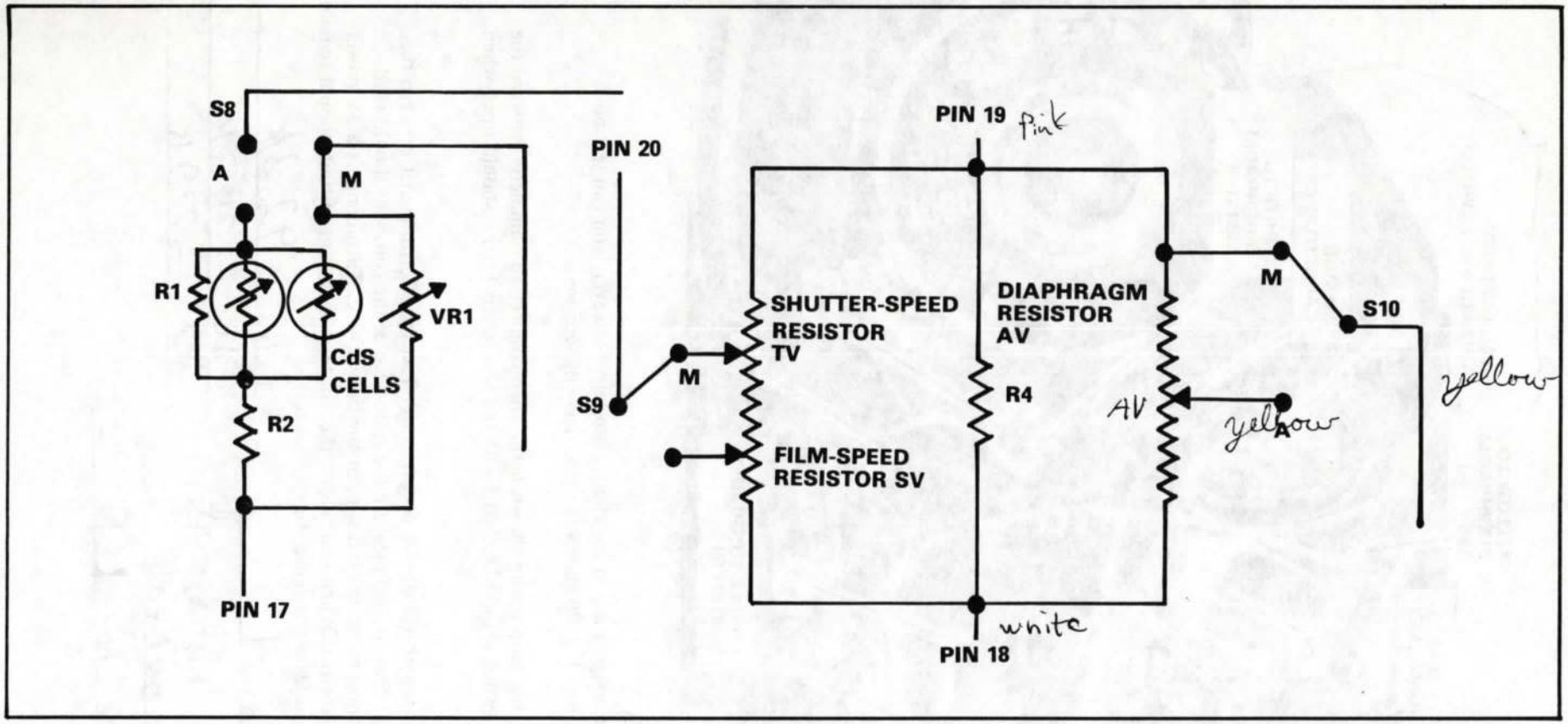


24B

The changeover switch includes switches S8, S9, and S10. At the automatic setting, switch S8 connects the CdS cells to the control circuit. Switch S9 connects the film-speed resistor to the control circuit, and switch S10 connects the diaphragm resistor to the control circuit. All three resistance values now affect the charge on the memory capacitor C1.

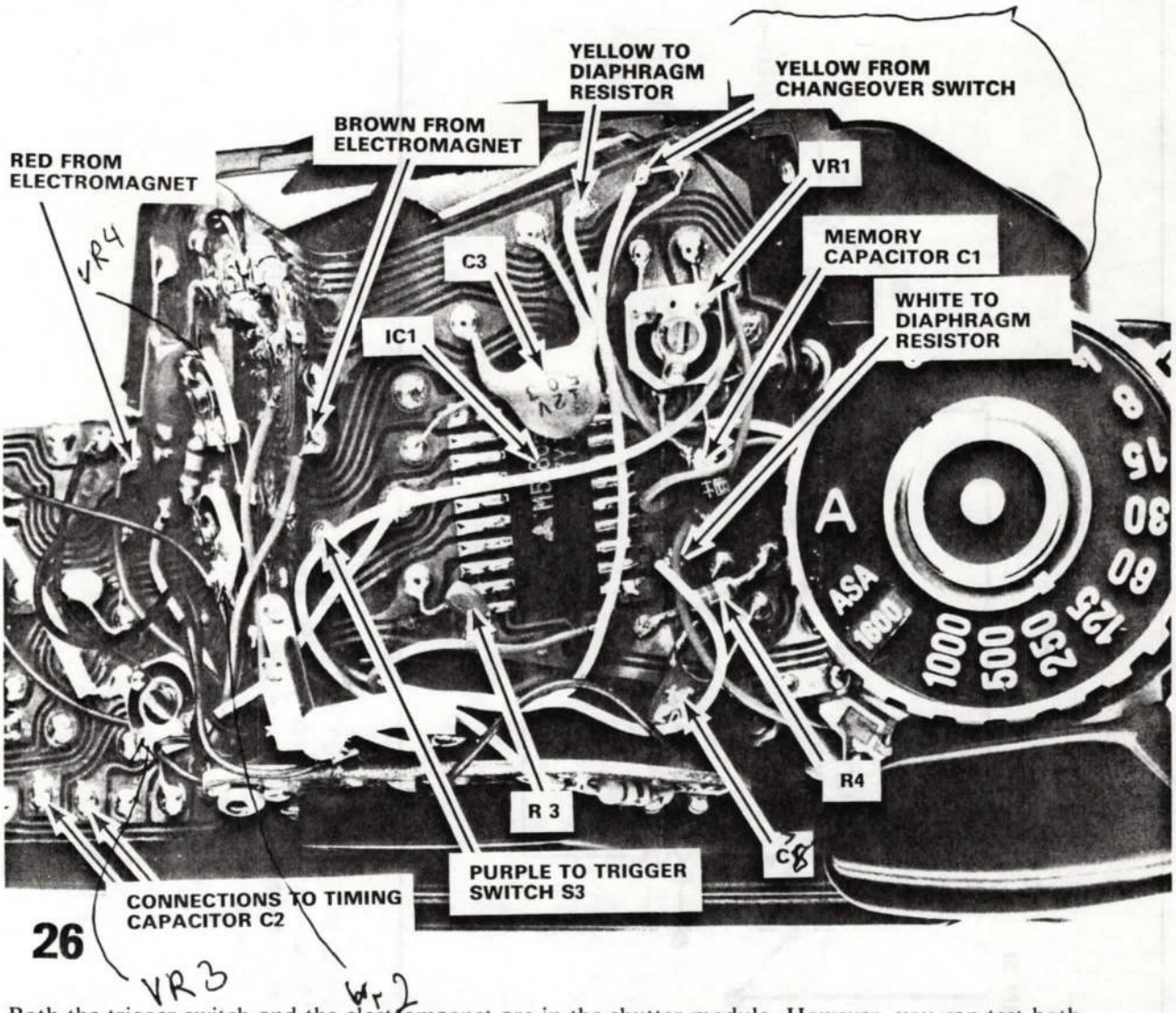


25A



25B

At the manually set shutter speeds, switch S8 disconnects the CdS cells; instead, S8 connects variable resistor VR1 to the control circuit. Switch S10 disconnects the diaphragm resistor. At the same time, switch S9 disconnects the film-speed resistor and instead selects the shutter-speed resistor. The shutter-speed resistor and variable resistor VR1 now control the charge on the memory capacitor C1



26

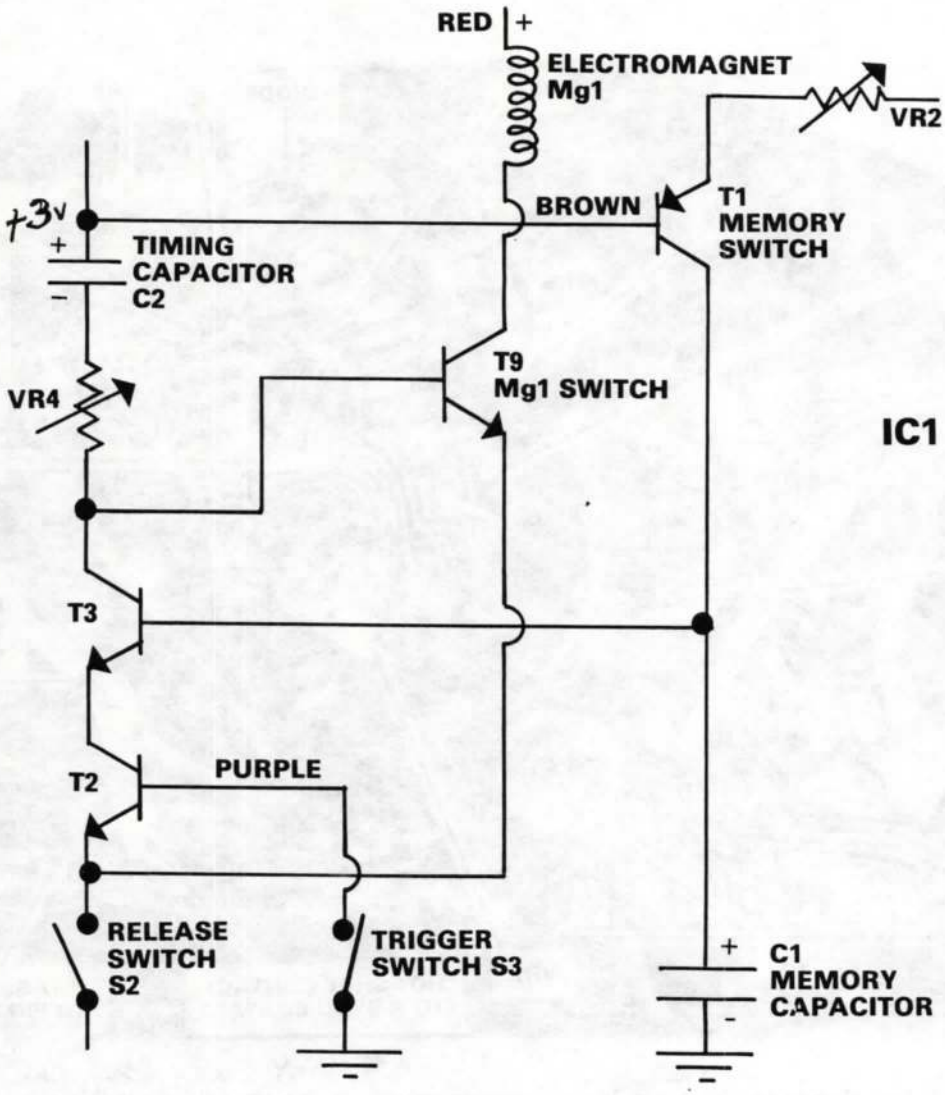
Both the trigger switch and the electromagnet are in the shutter module. However, you can test both components without further disassembly. Fig. 26 shows the electrical connections.

To test the trigger switch, disconnect the purple wire shown here. Then connect an ohmmeter between the purple wire and ground. The trigger switch should be closed with the shutter cocked; it should open when you release the shutter.

If the electromagnet is defective, the shutter will deliver no exposure. Test the electromagnet between the brown wire and the red wire indicated here. If you measure the resistance of the coil, you should read around 200 ohms. Or you can disconnect either the red wire or the brown wire. Then connect a 3V power supply between the two electromagnet wires. When you release the shutter, the closing curtain should remain in the open position for as long as you leave the power supply connected.

1st VR2 - Auto Manual
2nd VR4 - Manual - highspeed
3rd VR1 - Manual - overall
4th VR3 - Indicator for LED

f4 - 92.3K
f16 - 31.3K
f28 - 77.9K



Transistor T1 in IC1 serves as the memory switch. The current that charges the memory capacitor C1 flows through T1. As soon as TR4 (in IC4) conducts to release the mirror, T1 turns off. The voltage is then locked in the memory capacitor.

The voltage across the memory capacitor now determines the forward bias on transistor T3. The charge on the memory capacitor increases when:

1. the light intensity increases
2. you set a faster film-speed setting
3. you set a larger aperture.

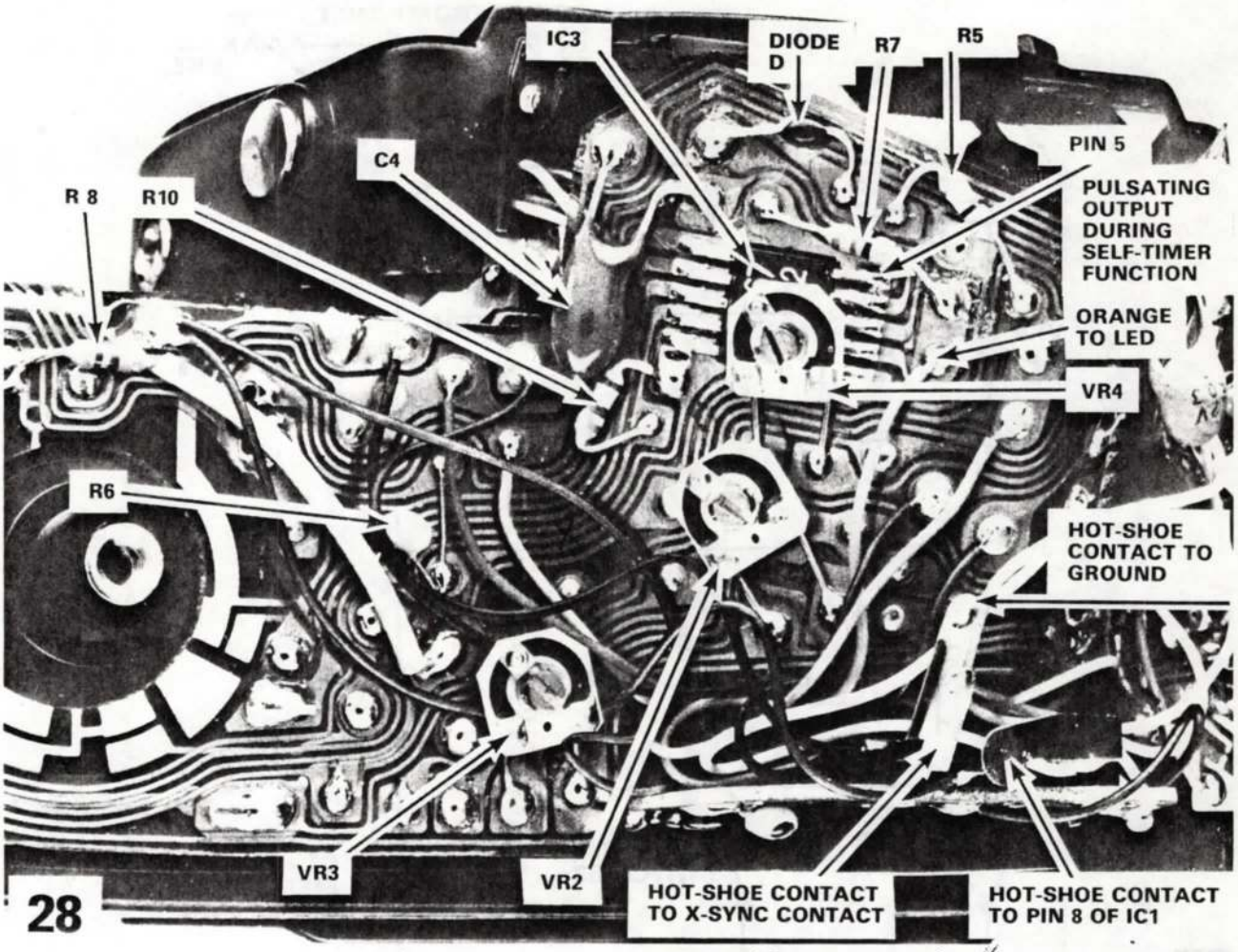
All of these conditions call for a shorter exposure time. At the manually set shutter speeds, however, the charge across the memory capacitor is controlled by the shutter-speed resistor.

Although transistor T3 has a memorized forward bias, it can't as yet conduct. That's because the trigger switch S3 is now closed, keeping transistor T2 turned off.

When the opening curtain releases, it opens the trigger switch. Transistor T2 then turns on. As a result, current flows through T3 to charge the timing capacitor.

The charge memorized by the memory capacitor C1 determines the amount of current flow. Remember, the memorized voltage controls the forward bias on T3. A larger forward bias means transistor T3 conducts more current, thereby charging the timing capacitor C2 more quickly.

When the timing capacitor C2 reaches the reference voltage, it turns off transistor T9. Turning off T9 stops the current flow through the electromagnet to release the closing curtain.

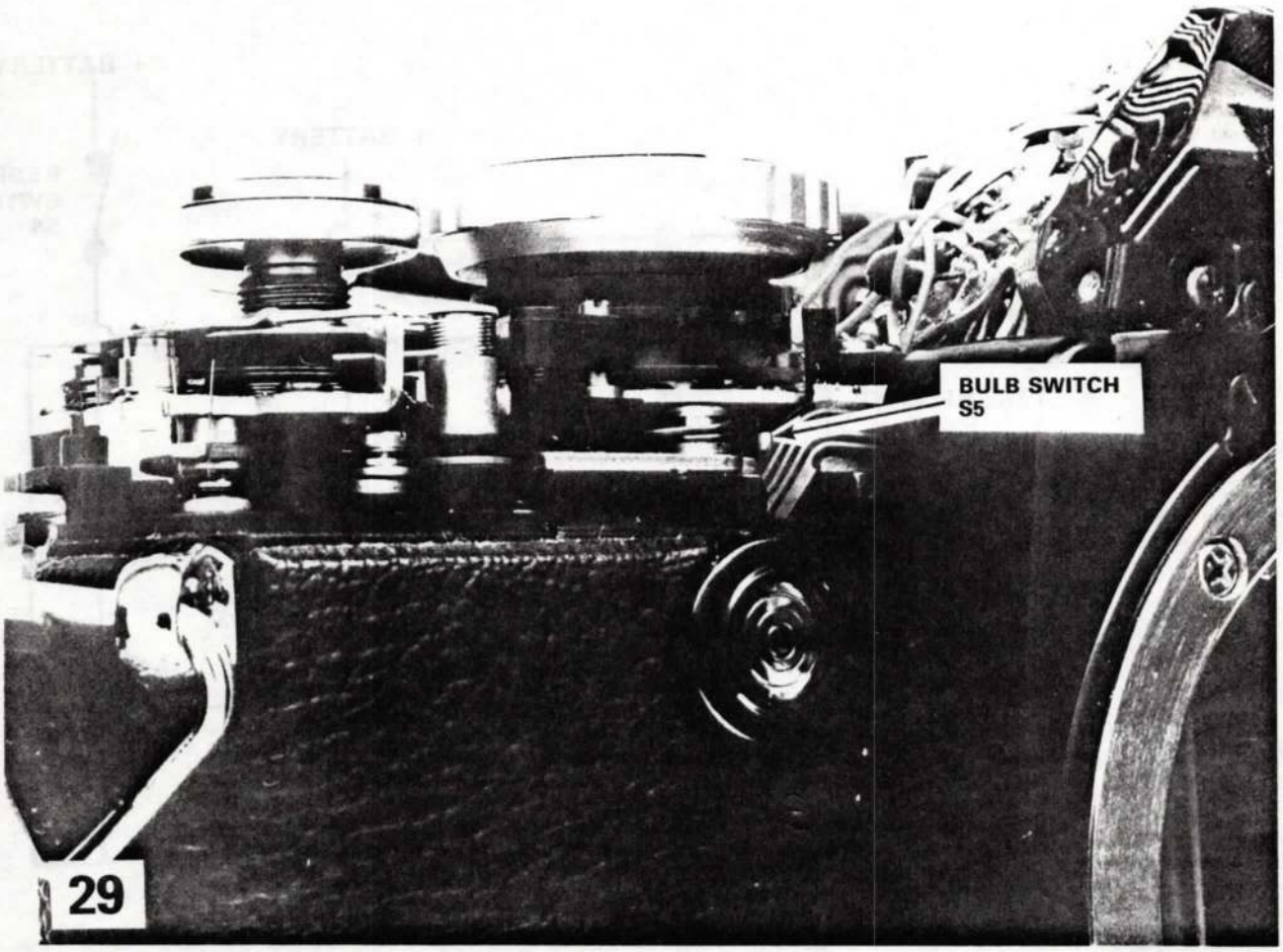


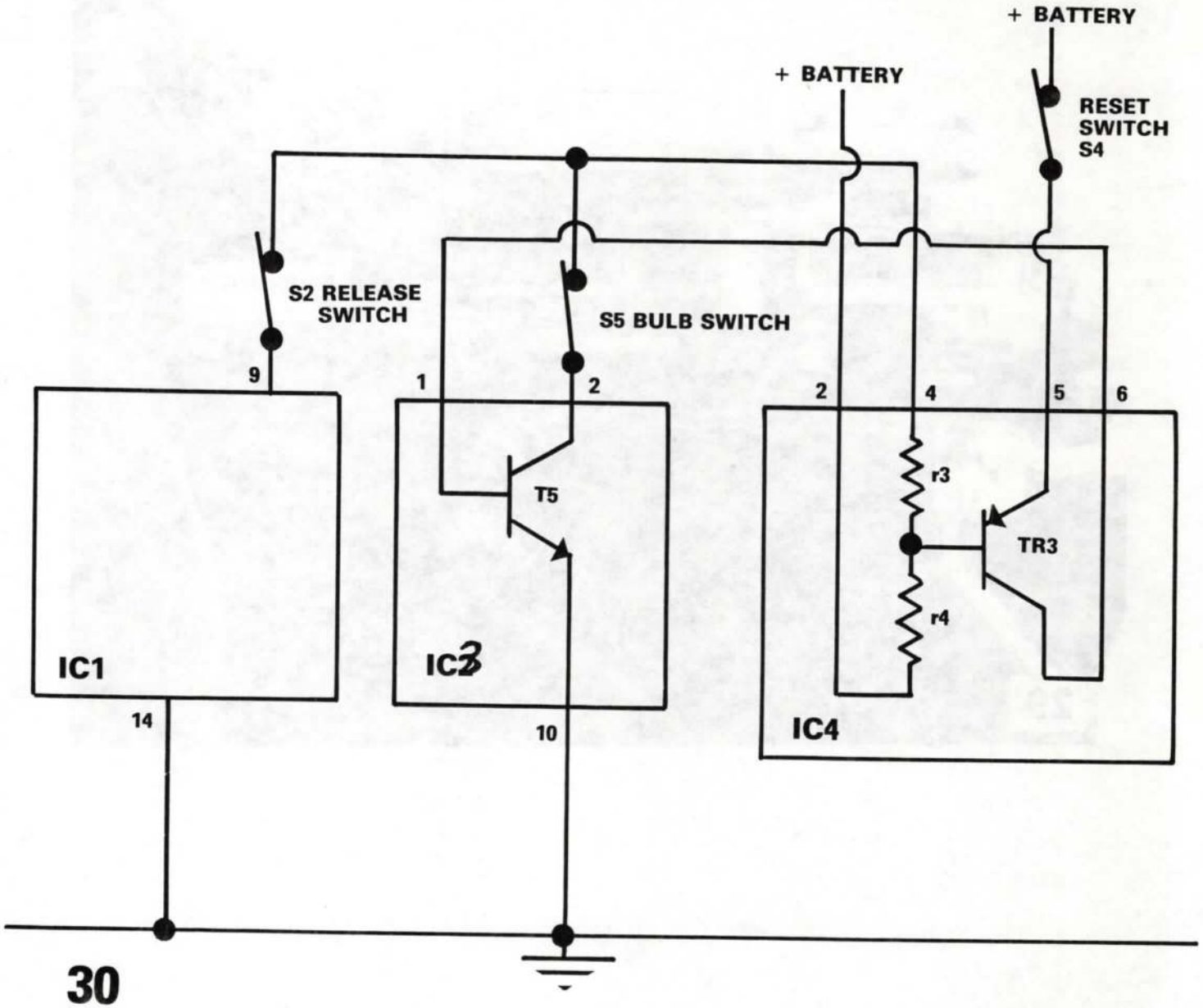
X = IC-2 @ IC4 at bottom

At pin 5 of IC3, you should measure a pulsating voltage output during the self-timer function. Connect your negative voltmeter lead to ground; touch the positive voltmeter lead to pin 5. Set the voltmeter to the 3V scale.

Now set the mode switch to the self-timer function and push the release button. You should see the pulsating output on the voltmeter, the output that drives the self-timer LED. C4 is the capacitor for the oscillator, and R6 provides the time delay for the self-timer function.

The red wire which goes to the electromagnet, Fig. 26, also connects to the battery-test and self-timer LED. You can check the LED without removing the shutter module. Disconnect either of the LED wires -- the red wire or the orange wire. Then connect a 2V DC power supply between the wires; connect the positive power-supply lead to the red wire and the negative power-supply lead to the orange wire. The LED should glow.


BULB SWITCH
S5
29



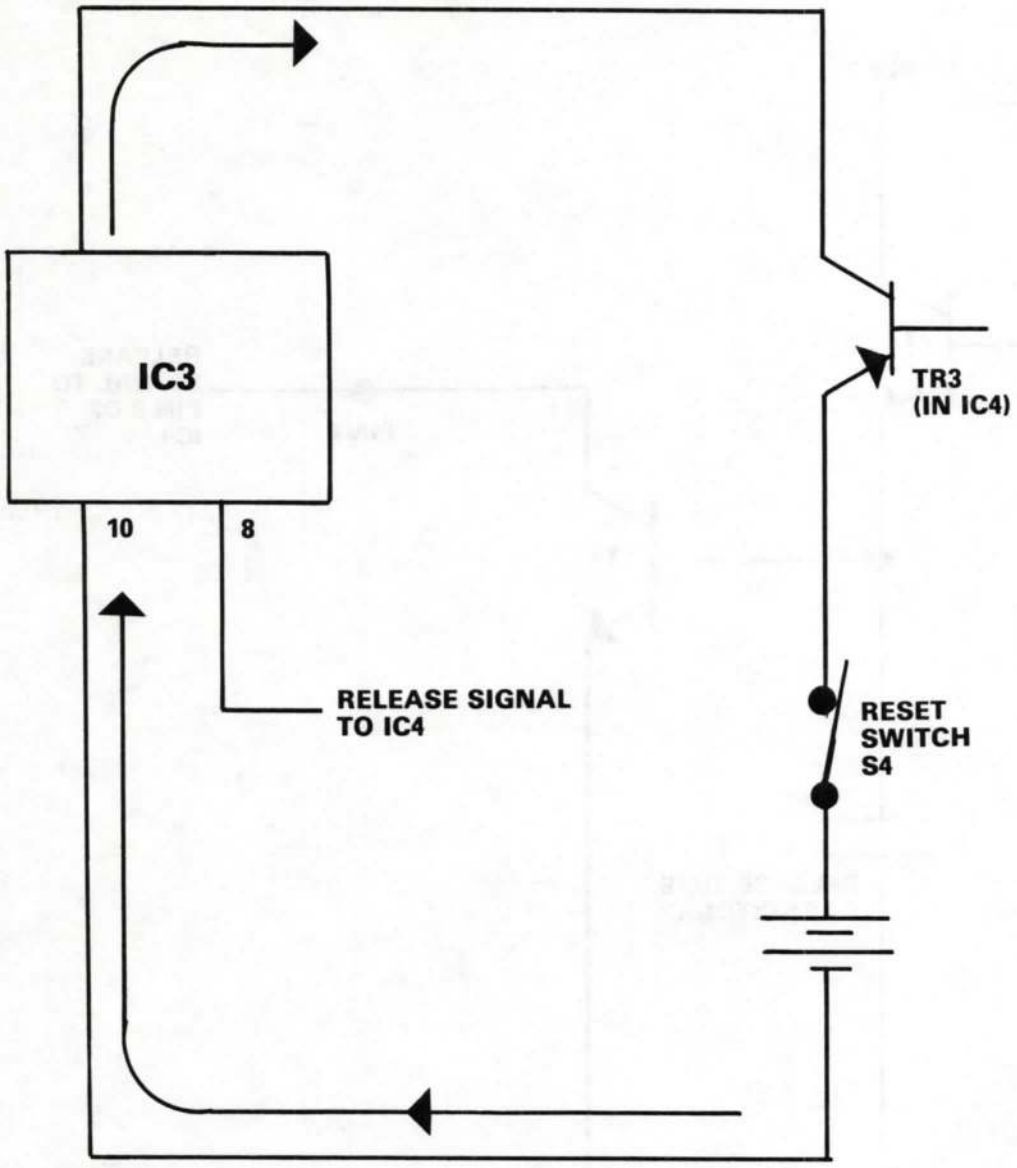
30

Three integrated circuits -- IC1, IC2, and IC4 -- work together to provide the release action. Pushing the release button closes the release switch S2. Current then flows through resistors r3 and r4 in IC4, turning on transistor TR3.

When transistor TR3 turns on, it switches on transistor T5 in IC2. T5 now provides the holding current. So, even if you let up the release button to open switch S2, current still flows through resistors r3 and r4. TR3 in IC4 remains turned on for the full duration of the exposure, supplying current to the circuit. At the end of the exposure, the reset switch S4 opens and turns off TR3.

T5 then serves as a switch to provide the holding current. If it weren't for the action of T5, you'd have to hold down the release button for the full exposure time. Since T5 maintains the holding current, it also can provide the bulb action.

The bulb switch S5 is normally closed. But, when you set the speed knob to bulb, the bulb switch S5 opens. Only switch S2 now maintains the holding current to transistor TR3. The shutter stays open as long as you hold the release button depressed. When you let up the release button, switch S2 opens and shuts off the holding current. Transistor TR3 then shuts off, and the shutter closes.

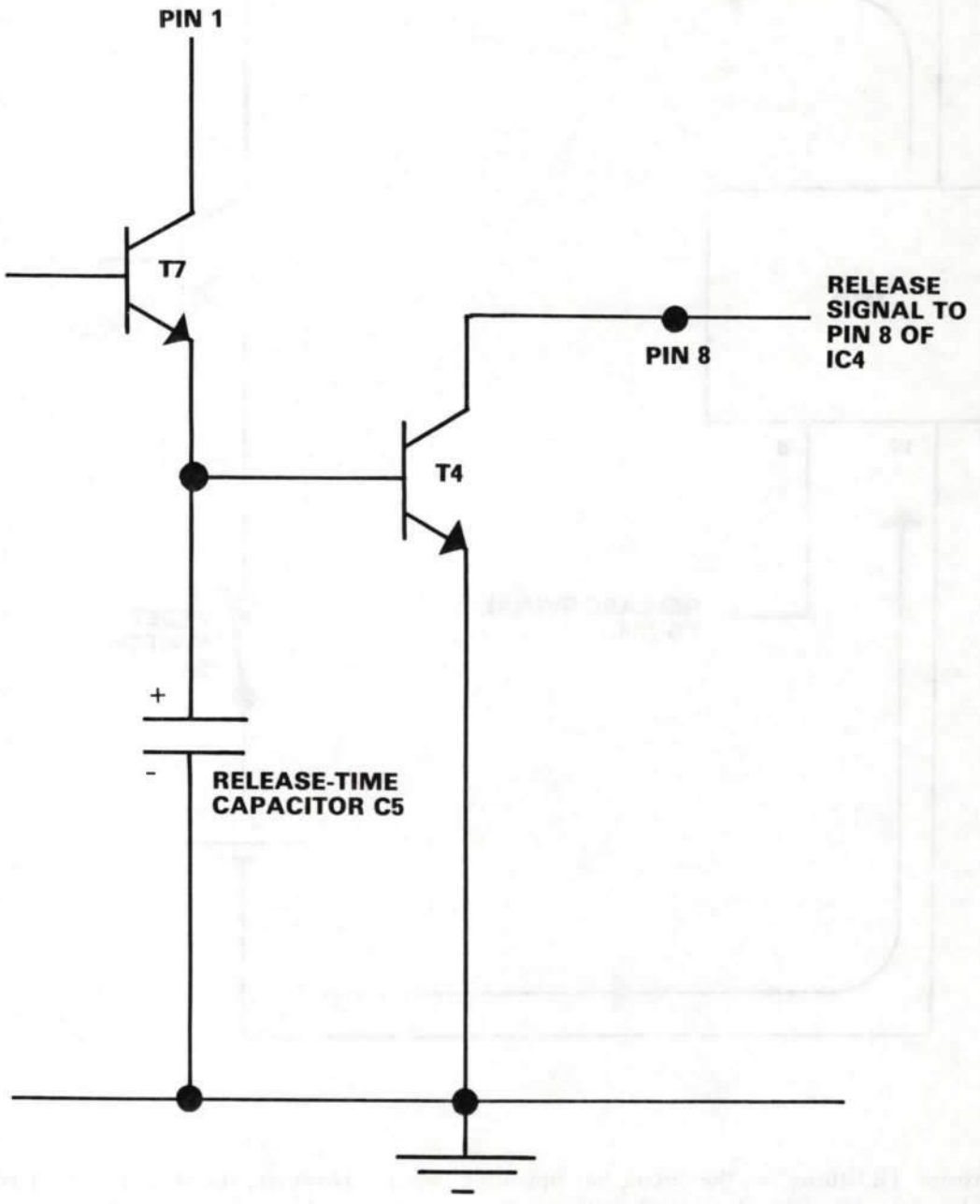


31

Once transistor TR3 turns on, the circuit has operating current. However, the shutter doesn't release until IC3 provides the release signal at pin 8. When IC3 provides the release signal, it tells IC4 to release the mirror. The release capacitor then discharges through the coil of the combination magnet Mg2.

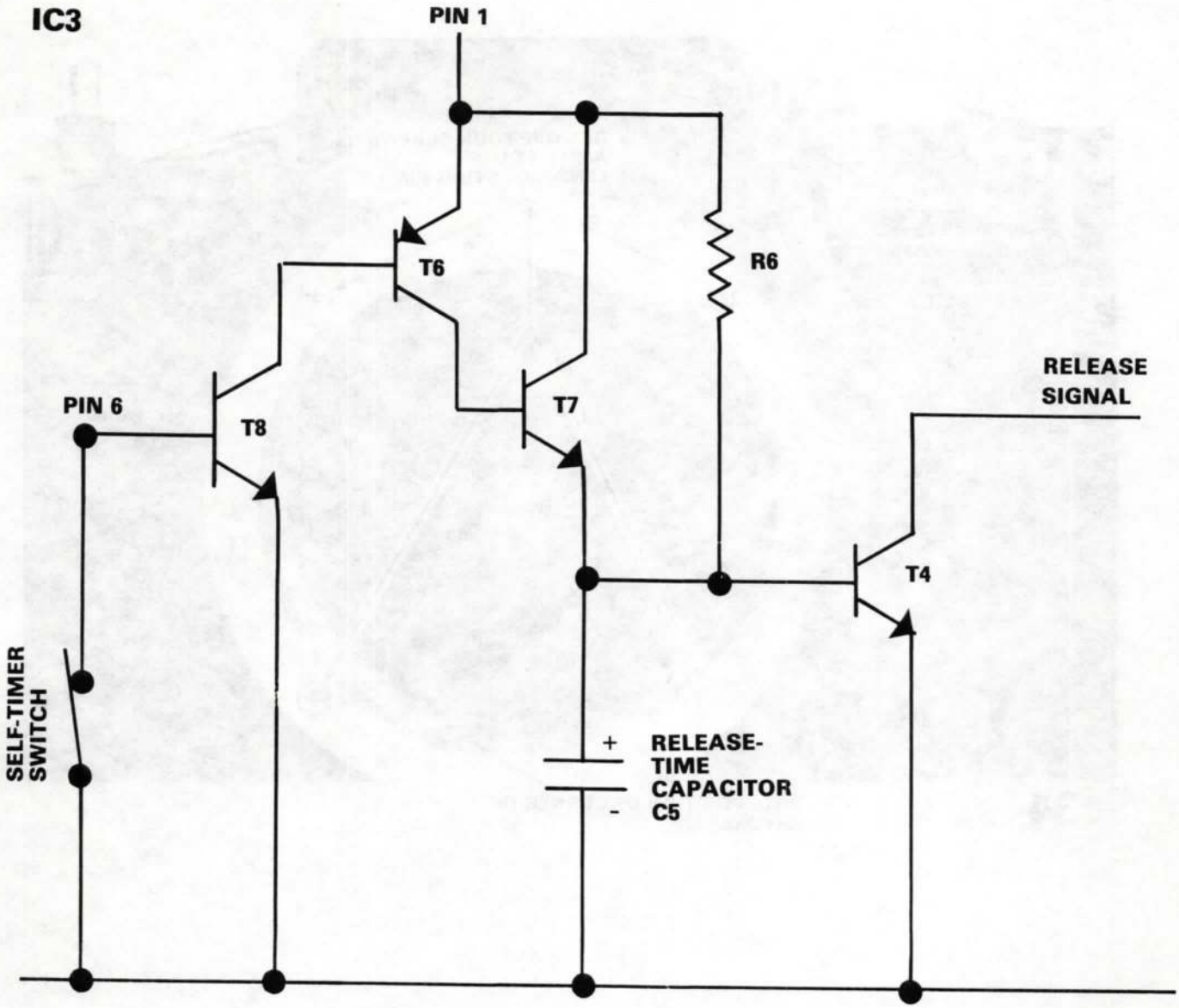
In normal operation, IC3 provides the release signal very quickly -- almost at the moment you fully depress the release button. However, if you're using the self-timer function, IC3 waits several seconds to provide the release signal.

IC3 won't provide the release signal if the battery voltage is too low for proper operation. Also, IC3 won't provide the release signal if the shutter is going to program an overexposure. Consequently, the circuit has an automatic safety feature -- it won't release the shutter unless the exposure is going to be right.



32

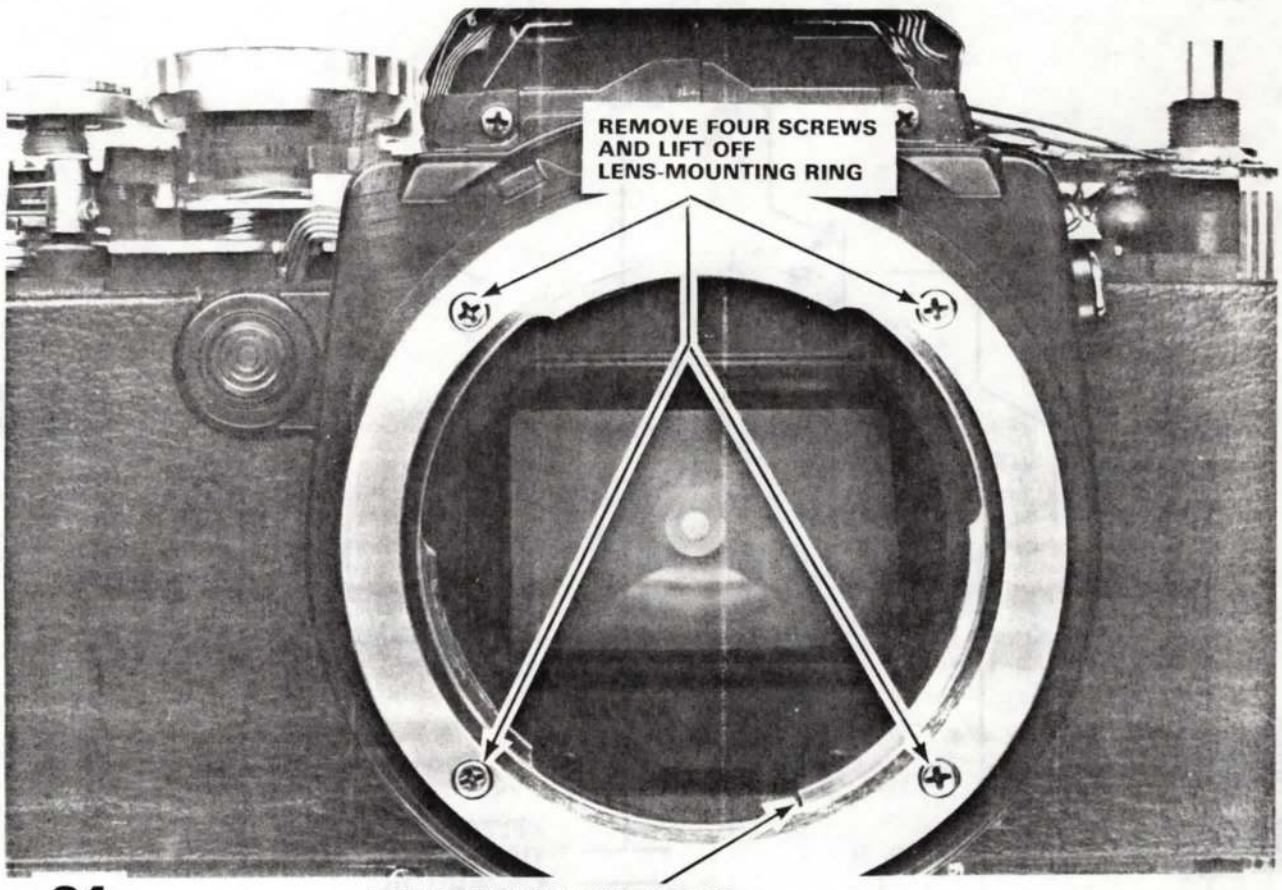
When you push the release button to release the shutter, the release-time capacitor C5 charges through transistor T7. The low-resistance charging path allows C5 to charge quickly. C5 then turns on transistor T4. Transistor T4 now supplies the current that turns on transistor TR4 in IC4. When TR4 turns on, the release capacitor C6 discharges through the combination magnet Mg2 to release the mirror.



33

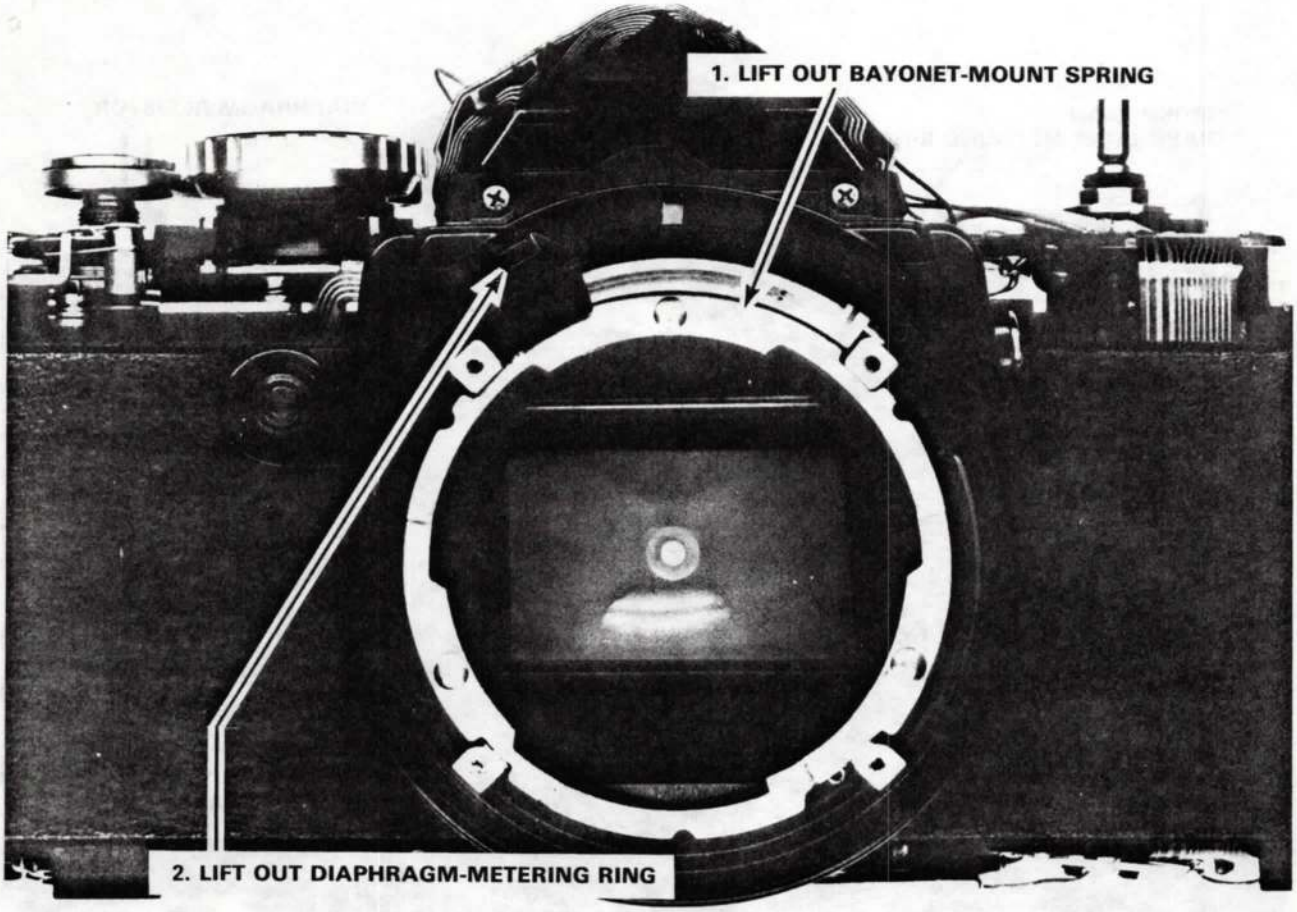
At the self-timer function, the self-timer switch (part of the mode switch) closes. The self-timer switch then shorts the base of transistor T8 to ground. Since T8 can't conduct, transistors T6 and T7 remain switched off.

As a result, the release-time capacitor C5 doesn't have its normal charging path through transistor T7. Instead, the release-time capacitor must charge through resistor R6. When the release-time capacitor reaches its signal charge, it turns on transistor T4 to provide the release signal just as it does during normal operation. But the long charging time of the release-time capacitor provides the self-timer delay, the delay between the time you push down the release button and the time the mirror actually releases.

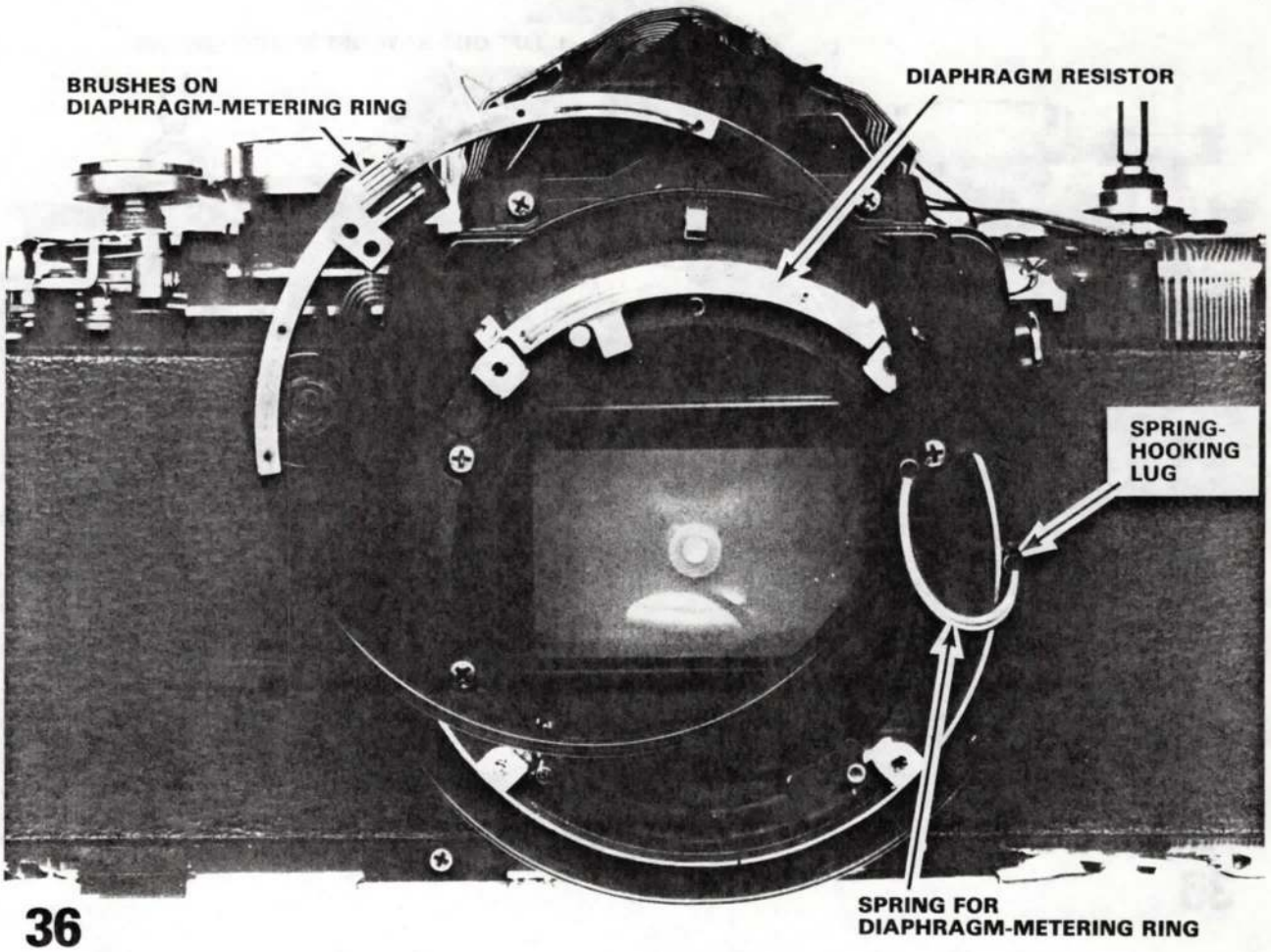


34

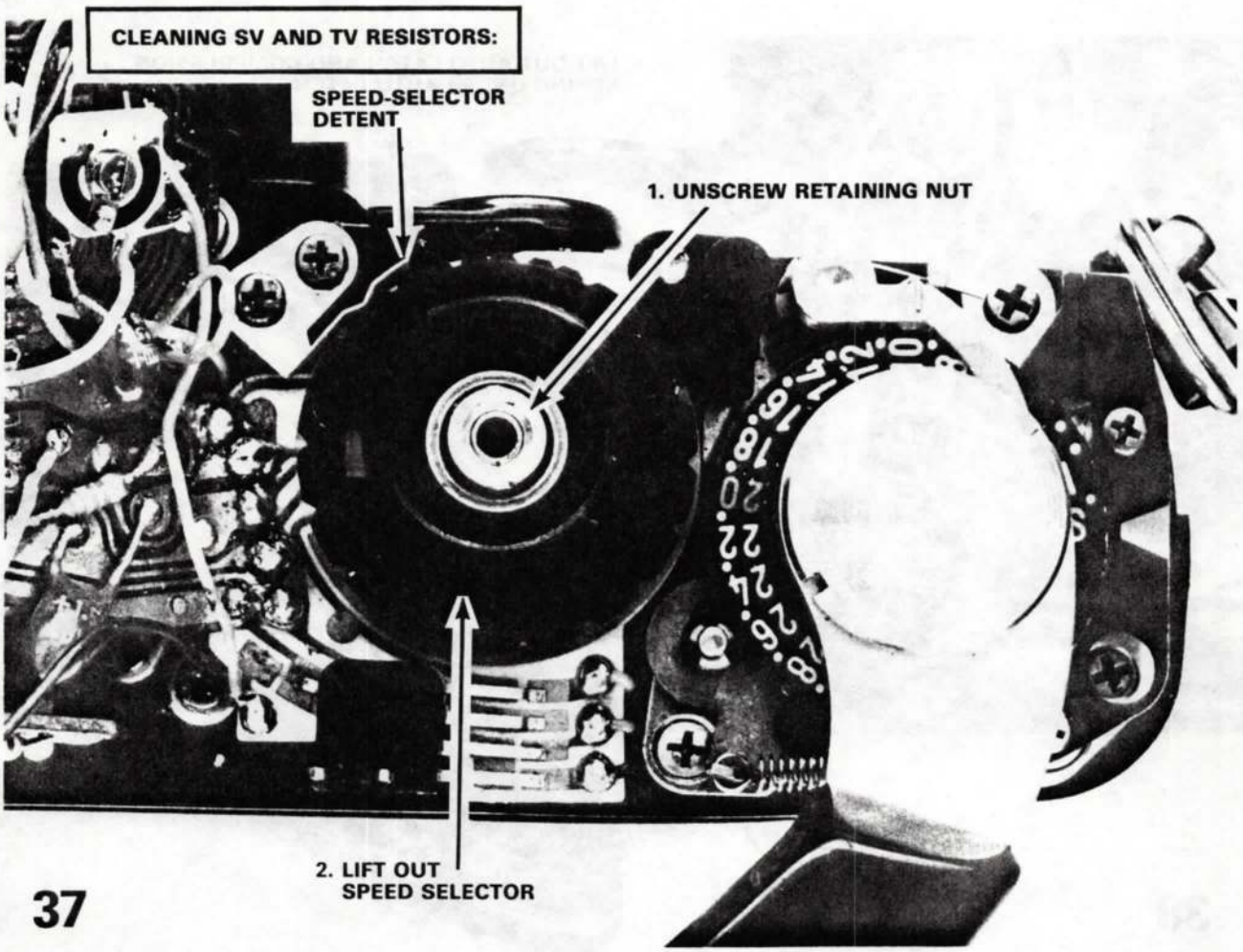
NOTE POSITION OF CORNER OF
BAYONET LIP

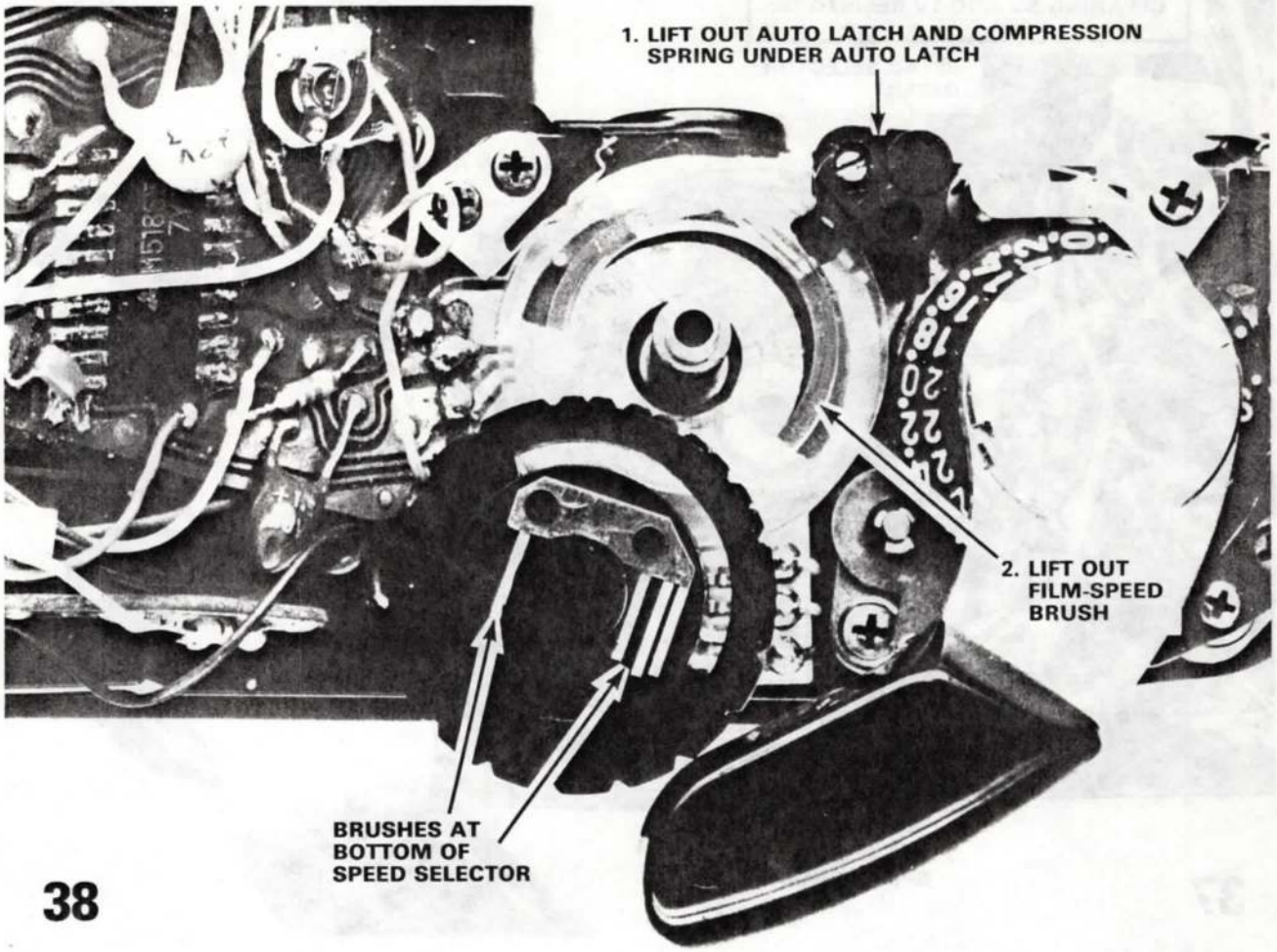

1. LIFT OUT BAYONET-MOUNT SPRING
2. LIFT OUT DIAPHRAGM-METERING RING

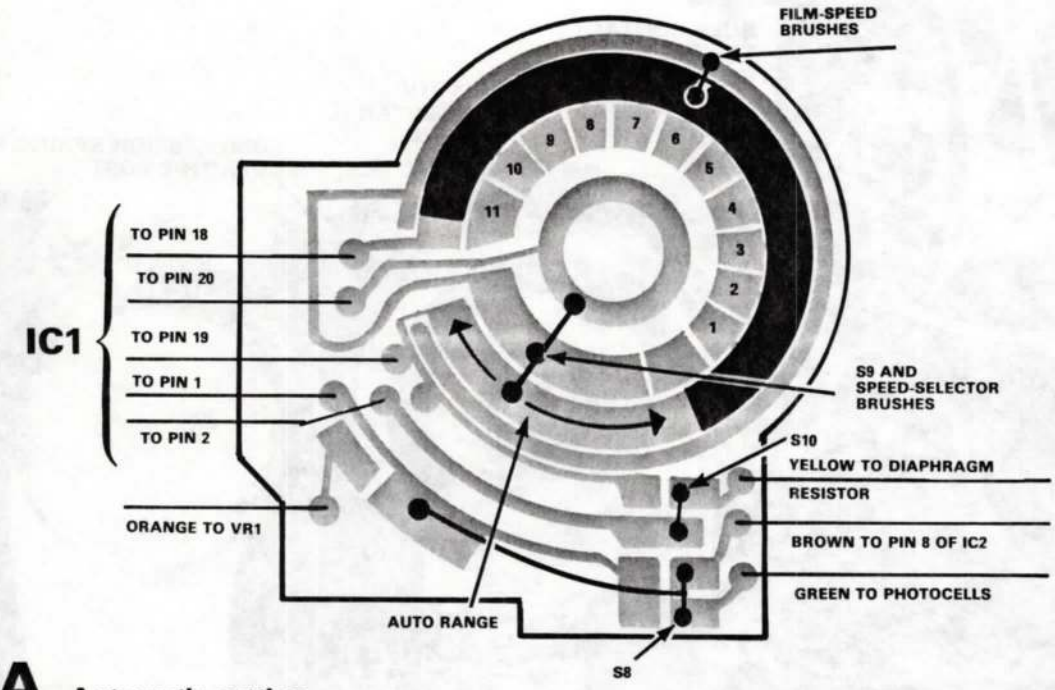
35



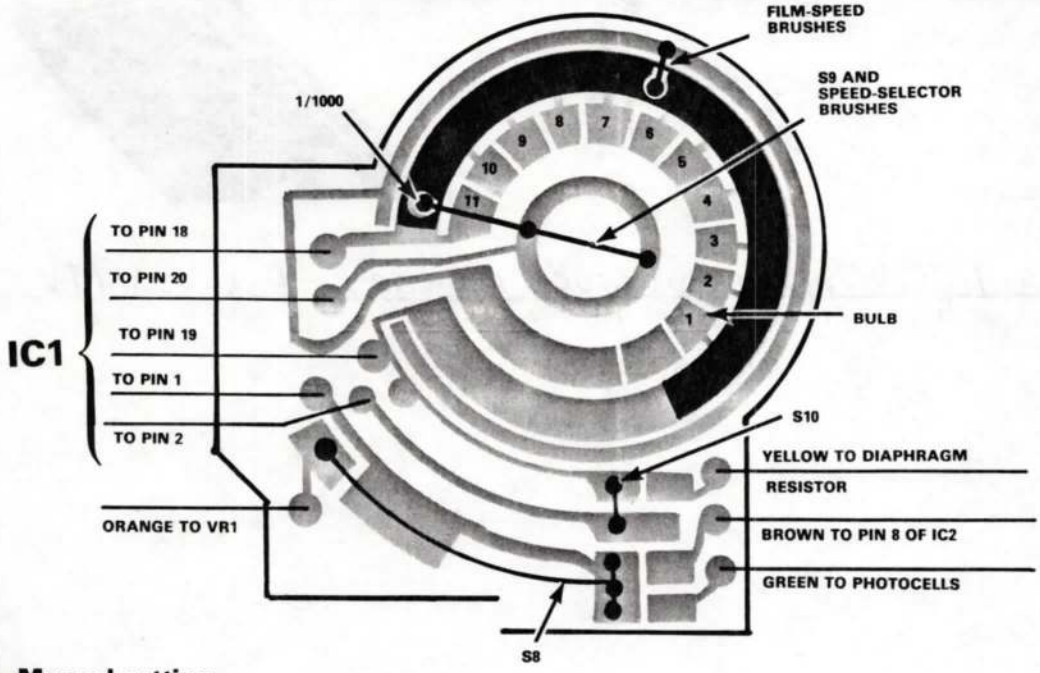
The bulb switch S5 should open when you turn the speed knob to the bulb setting. At all other settings, the bulb switch should close. If the bulb switch fails to close or makes poor contact, you'll get the bulb action at all speed-knob settings. Or, if the bulb switch remains closed at the bulb setting, you'll get a slow shutter speed rather than bulb action.


CLEANING SV AND TV RESISTORS:
SPEED-SELECTOR DETENT
1. UNSCREW RETAINING NUT
2. LIFT OUT SPEED SELECTOR


1. LIFT OUT AUTO LATCH AND COMPRESSION SPRING UNDER AUTO LATCH
2. LIFT OUT FILM-SPEED BRUSH
BRUSHES AT BOTTOM OF SPEED SELECTOR



40A **Automatic setting**

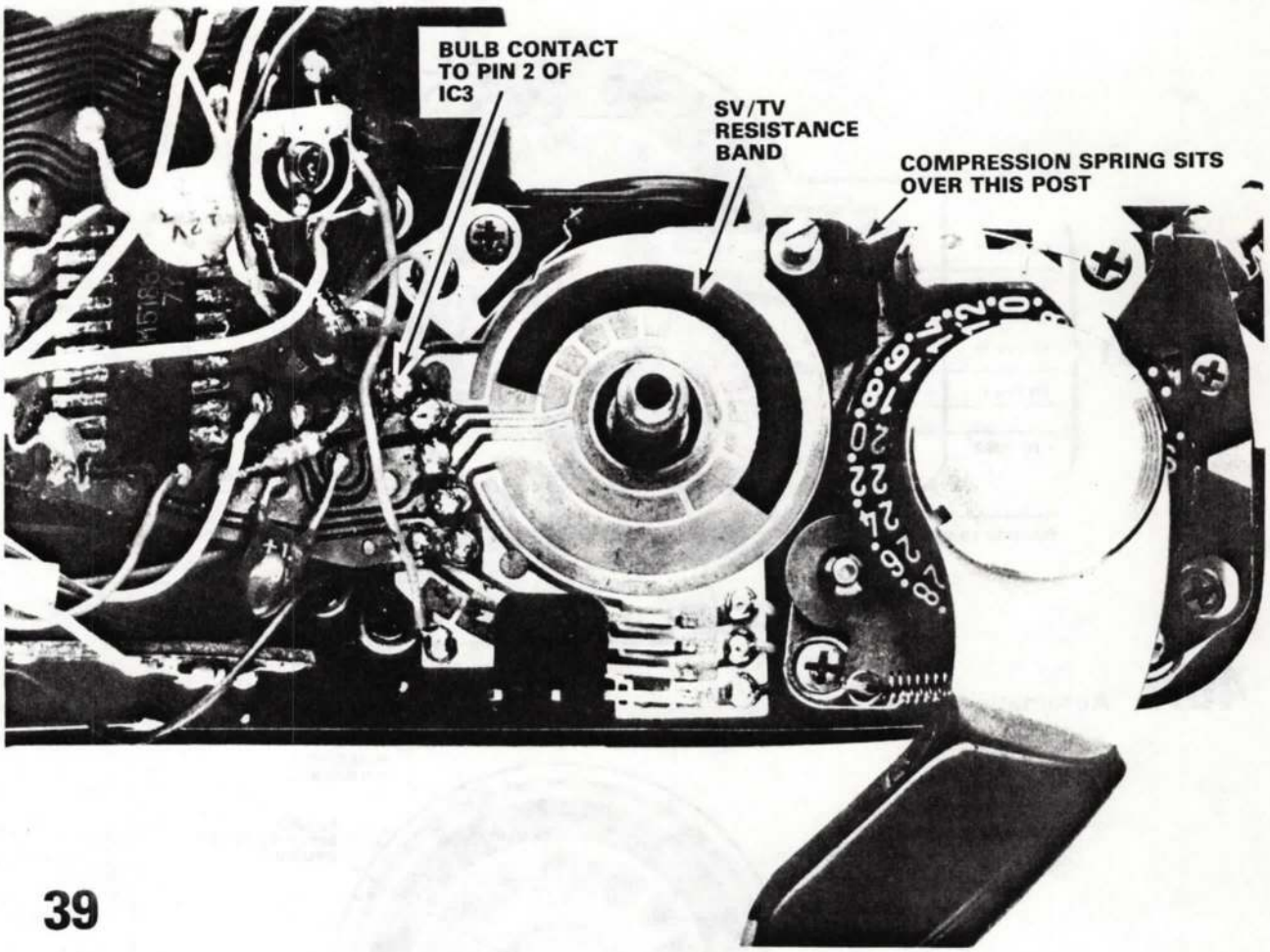


40B **Manual setting**

The brushes at the bottom of the speed selector select the resistances for the manually set shutter speeds and perform the switching action of S9. At the automatic settings, S9 connects the film-speed brush to pin 20 of IC1. The position of the film-speed brush then affects the charge on the memory capacitor.

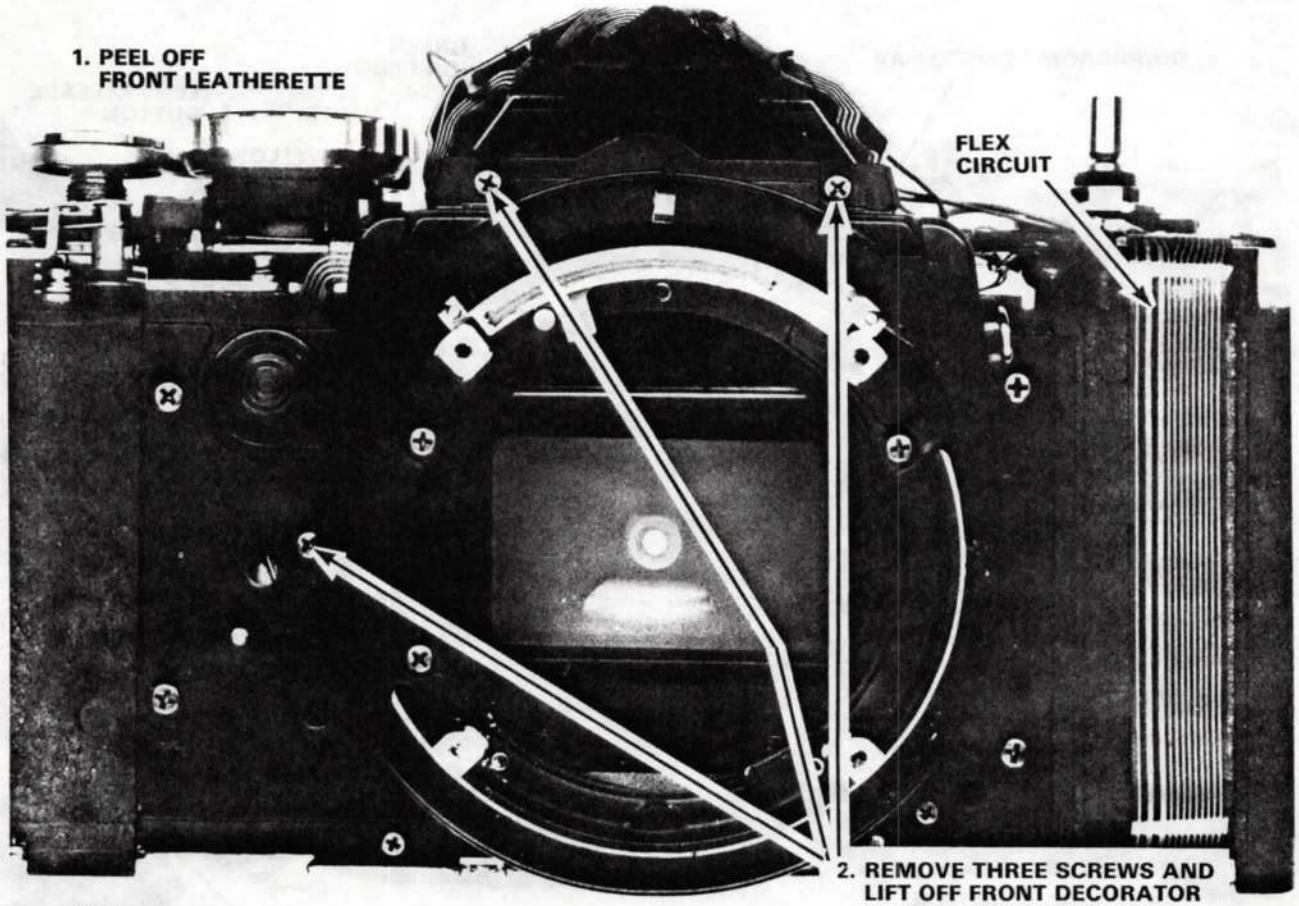
The changeover switch includes S8 and S10. On automatic, S8 connects the photocells and the LEDs to pin 1 of IC1. S10 connects the diaphragm resistor to pin 2 of IC1.

On the manually set shutter speeds, S9 disconnects the film-speed brush and connects the resistance band to pin 20. Now the shutter-speed settings, rather than the film-speed settings, affect the memory-capacitor charge. S8 disconnects the LEDs and the photocells and instead connects VR1 to pin 1 of IC1. S10 disconnects the diaphragm resistor and connects the end of the resistance band to pin 2 of IC1.

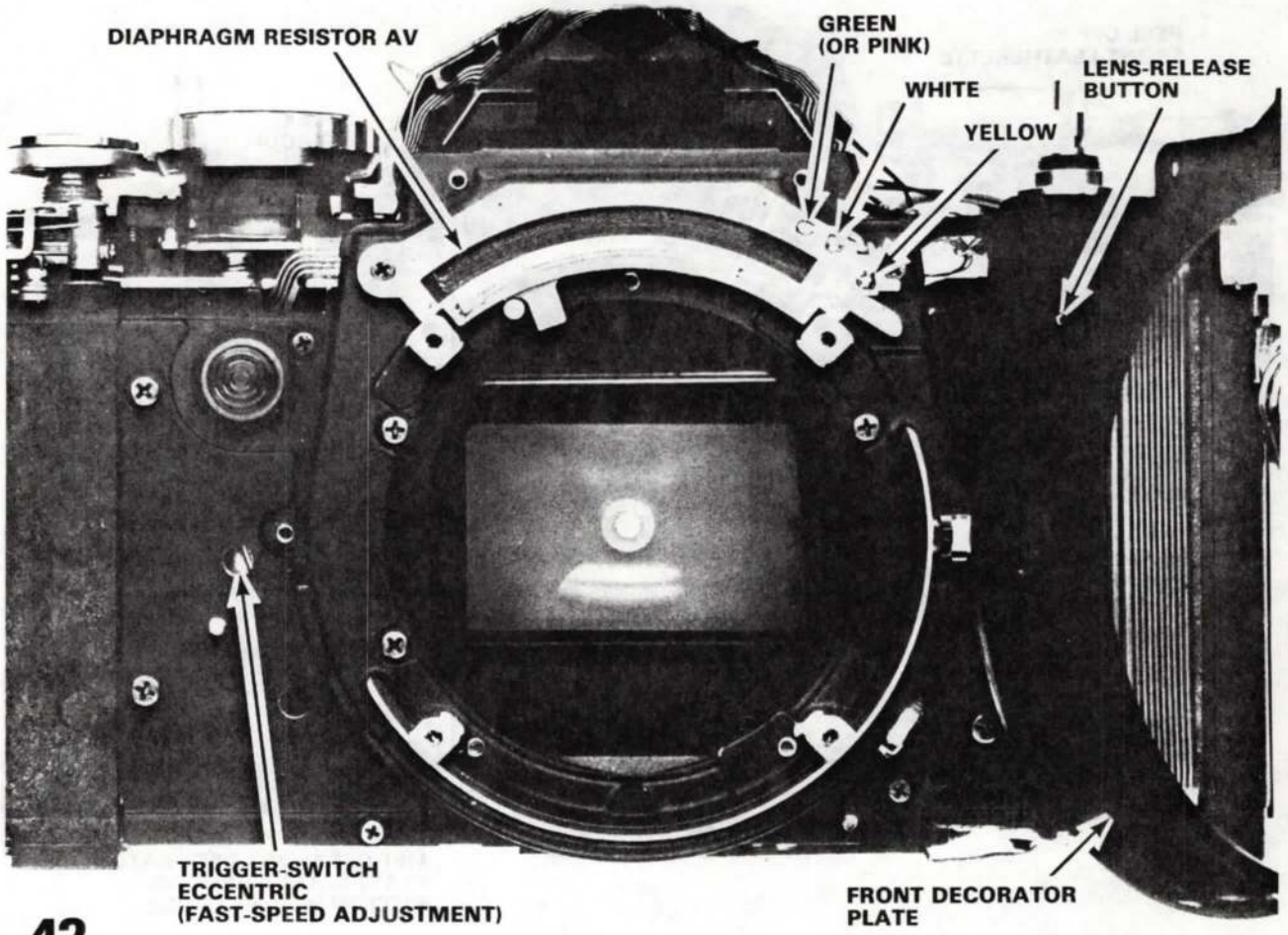


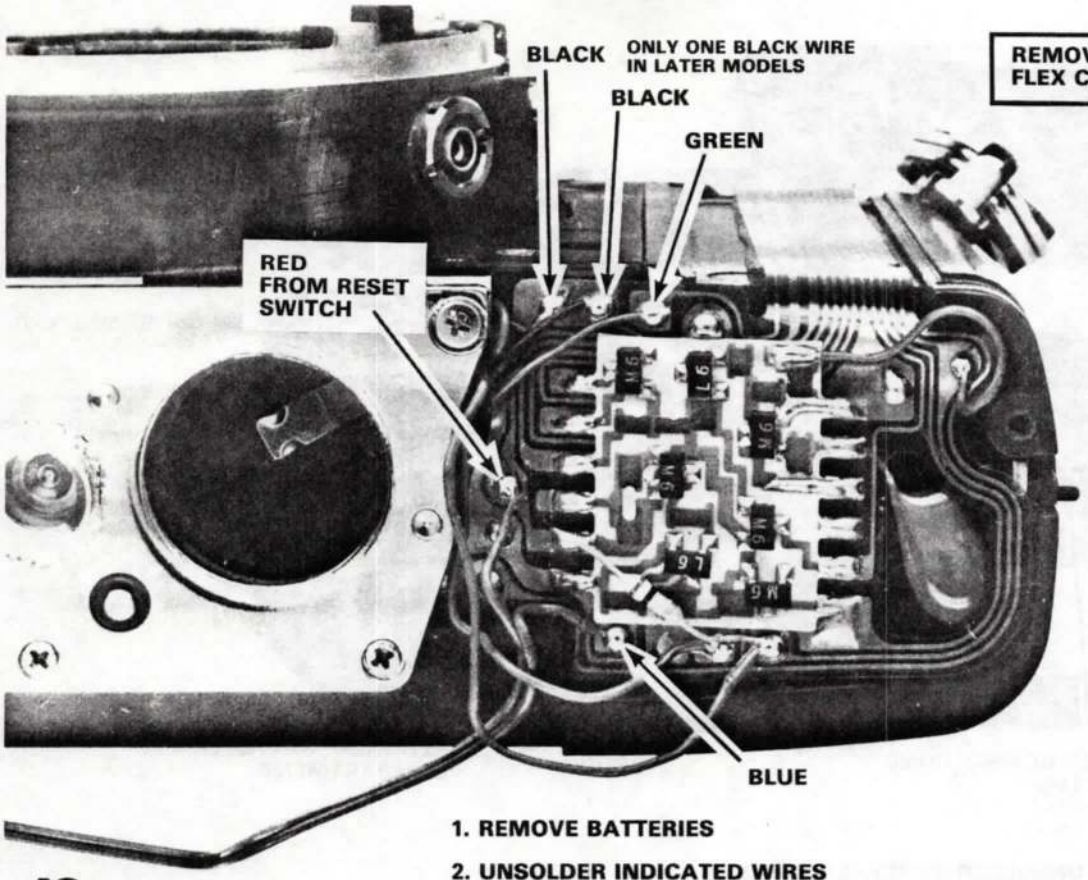
39

Use a liquid non abrasive cleaner for SV/TV resistor


1. PEEL OFF
FRONT LEATHERETTE
FLEX
CIRCUIT
2. REMOVE THREE SCREWS AND
LIFT OFF FRONT DECORATOR
PLATE — LENS-RELEASE
BUTTON WILL BE LOOSE

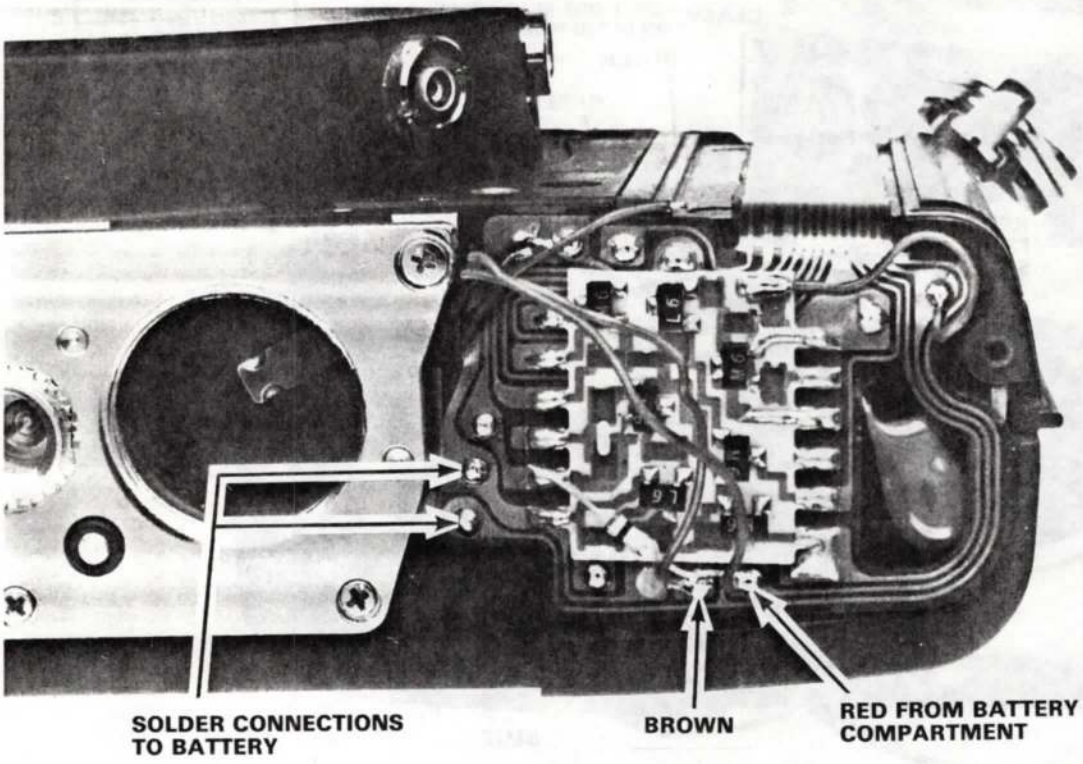
41


DIAPHRAGM RESISTOR AV
GREEN
(OR PINK)
WHITE
YELLOW
LENS-RELEASE
BUTTON
TRIGGER-SWITCH
ECCENTRIC
(FAST-SPEED ADJUSTMENT)
FRONT DECORATOR
PLATE



REMOVING THE FLEX CIRCUIT

1. REMOVE BATTERIES
2. UNSOLDER INDICATED WIRES

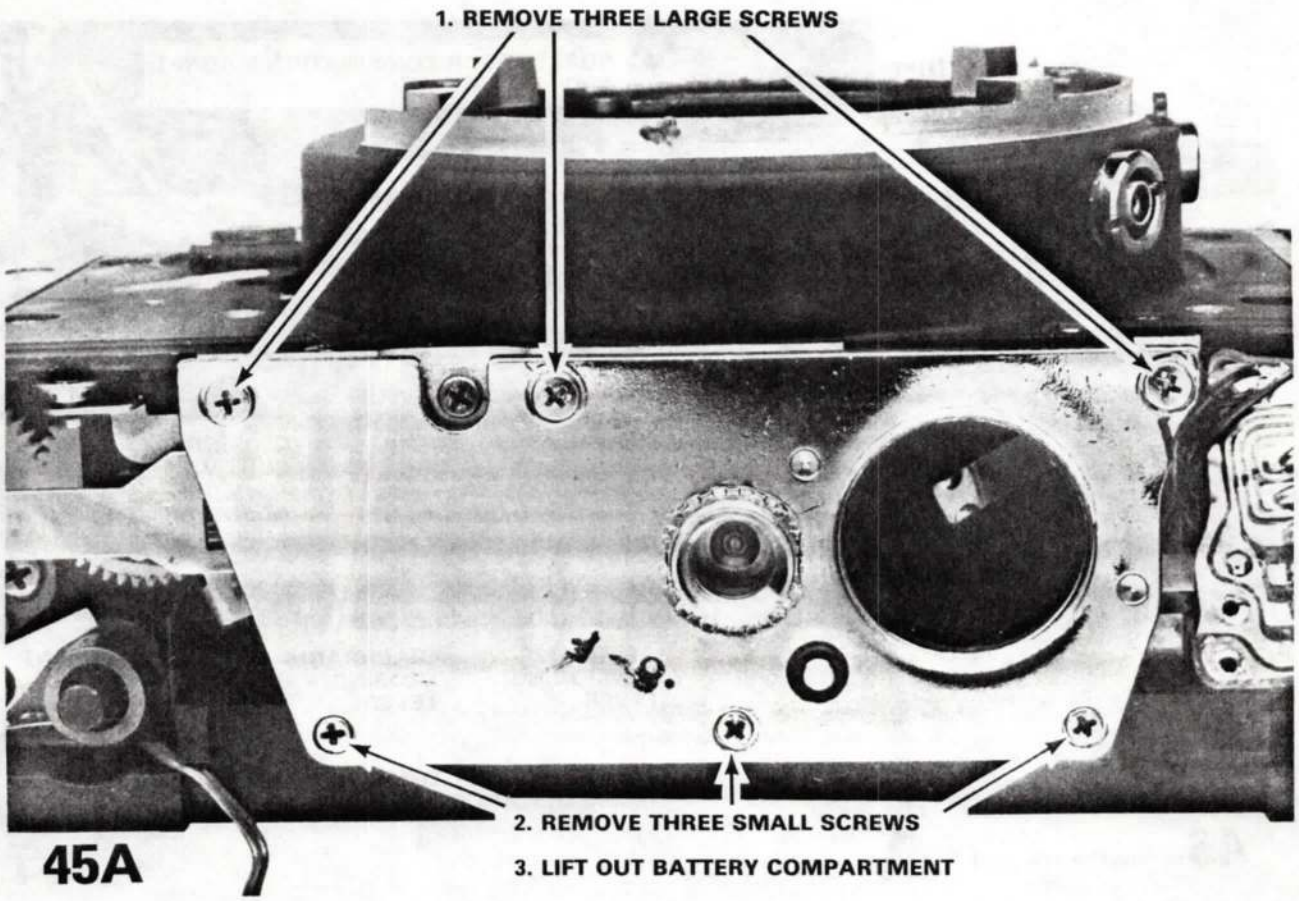


1. UNSOLDER INDICATED WIRES

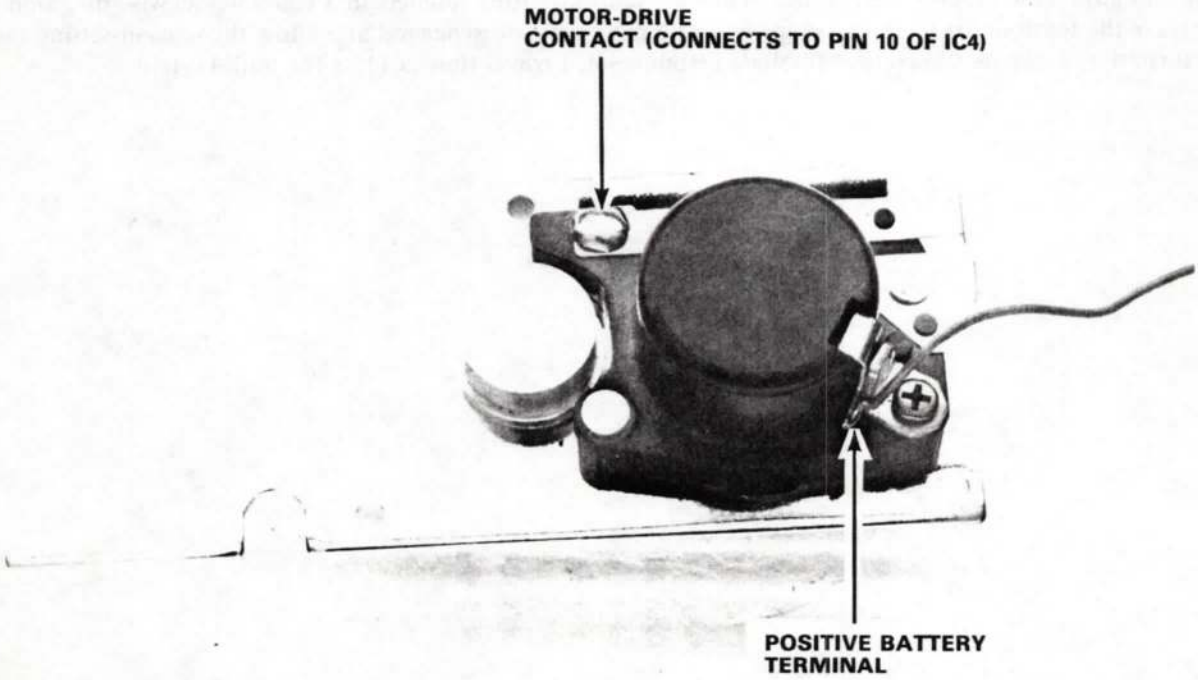
2. REMOVE SOLDER FROM BATTERY-COMPARTMENT TERMINALS

44

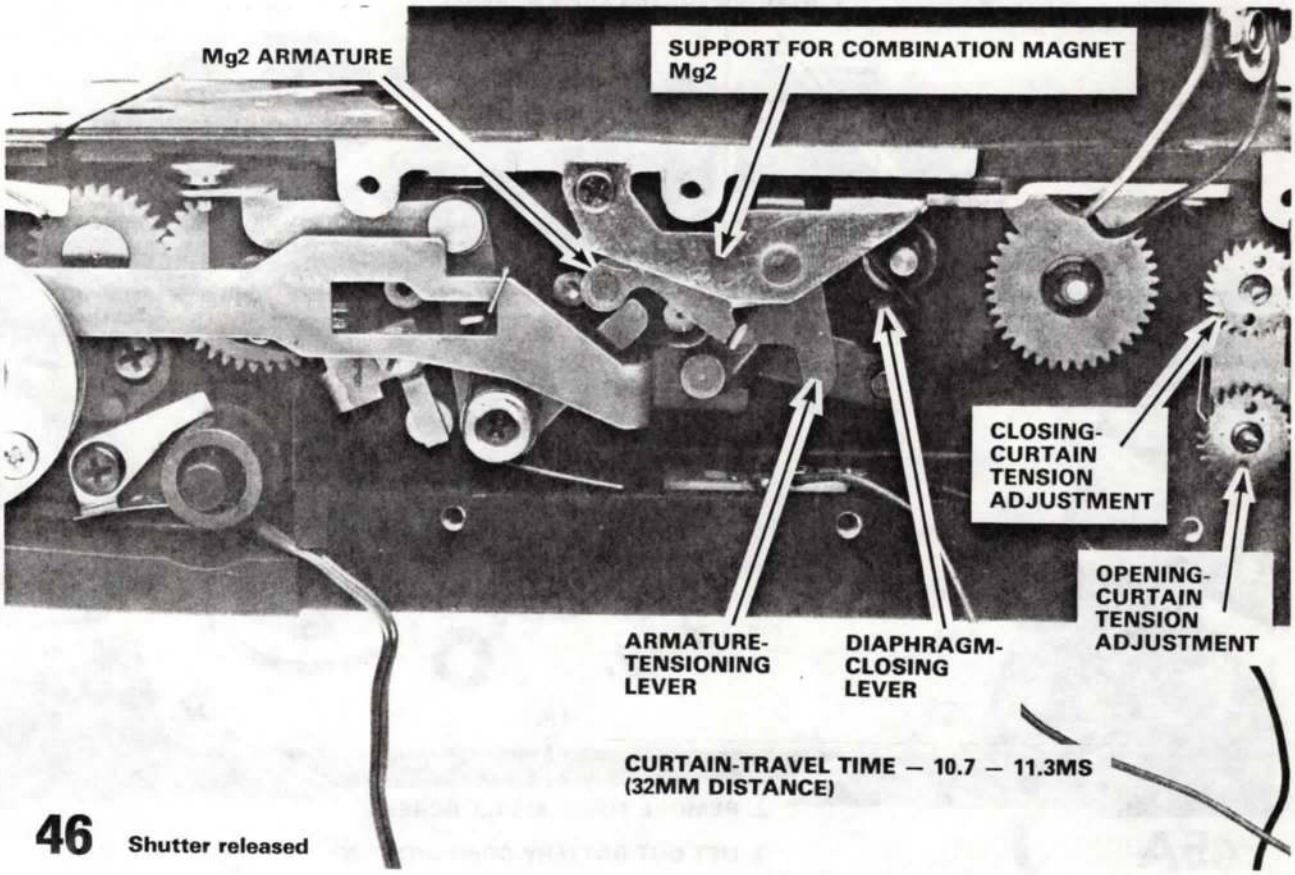
If you're just removing the battery compartment, you don't have to unsolder all wires indicated. Unsolder the red wire that comes from the battery compartment and remove the solder from the two battery-compartment terminals.


1. REMOVE THREE LARGE SCREWS
2. REMOVE THREE SMALL SCREWS
3. LIFT OUT BATTERY COMPARTMENT

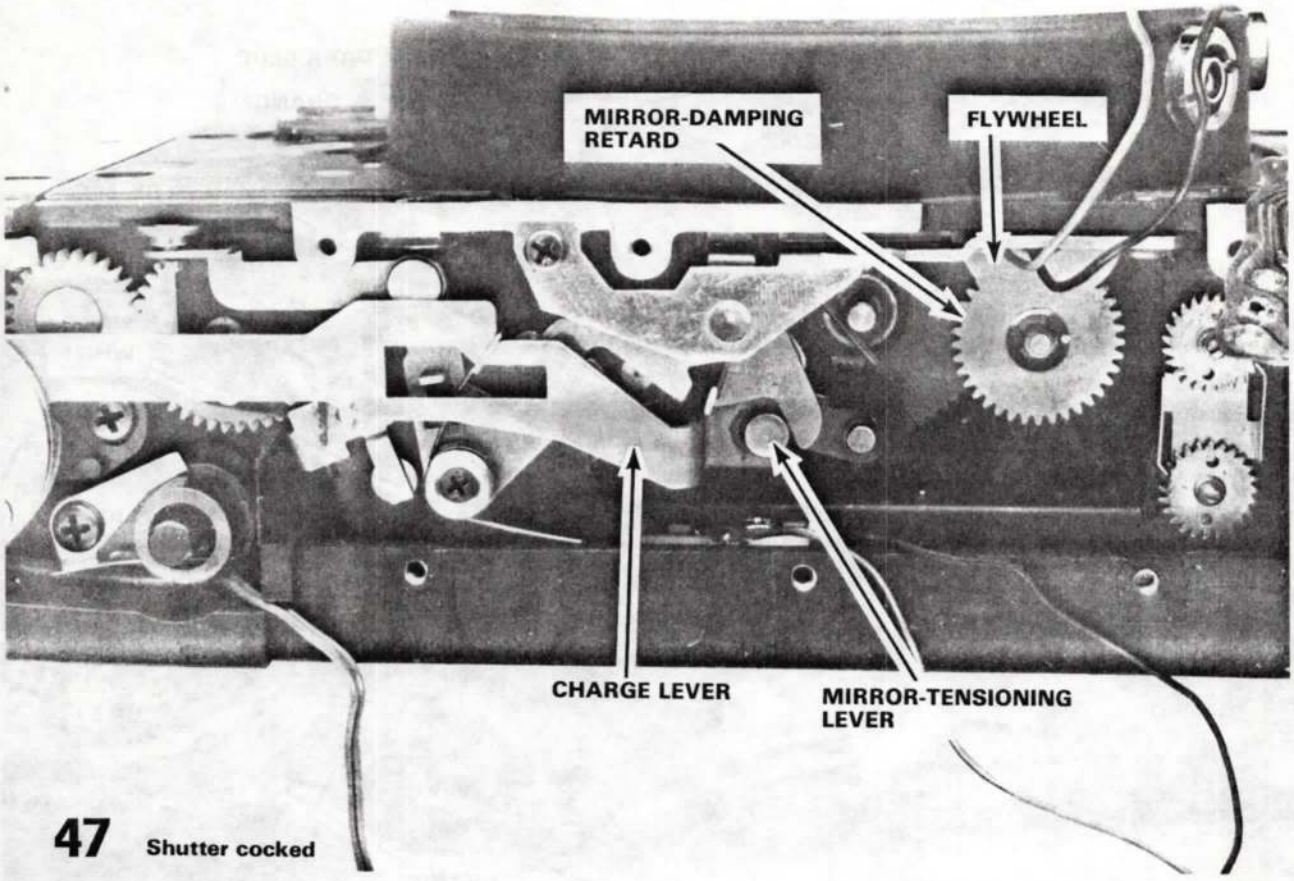
45A


MOTOR-DRIVE
CONTACT (CONNECTS TO PIN 10 OF IC4)
POSITIVE BATTERY
TERMINAL

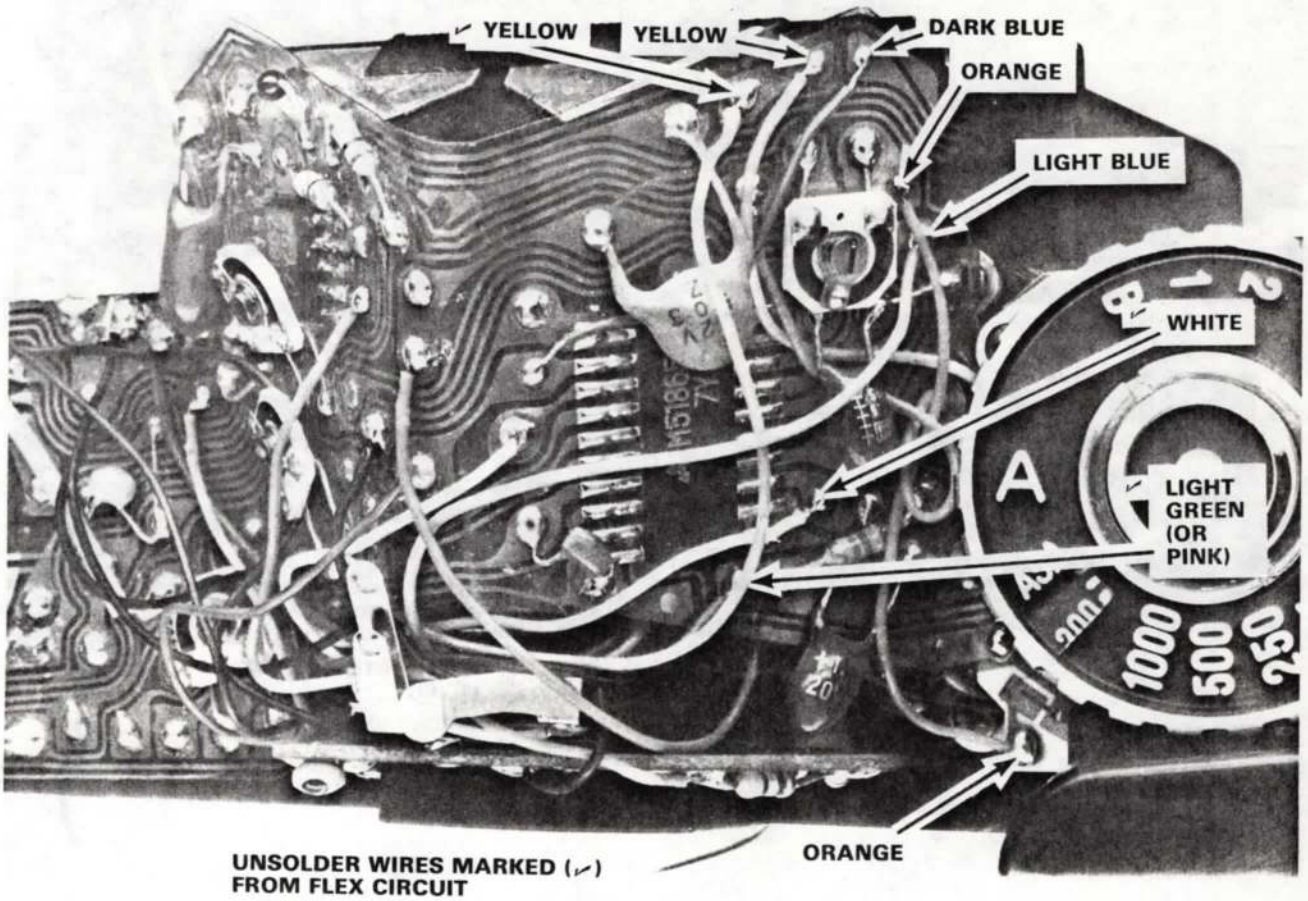
45B



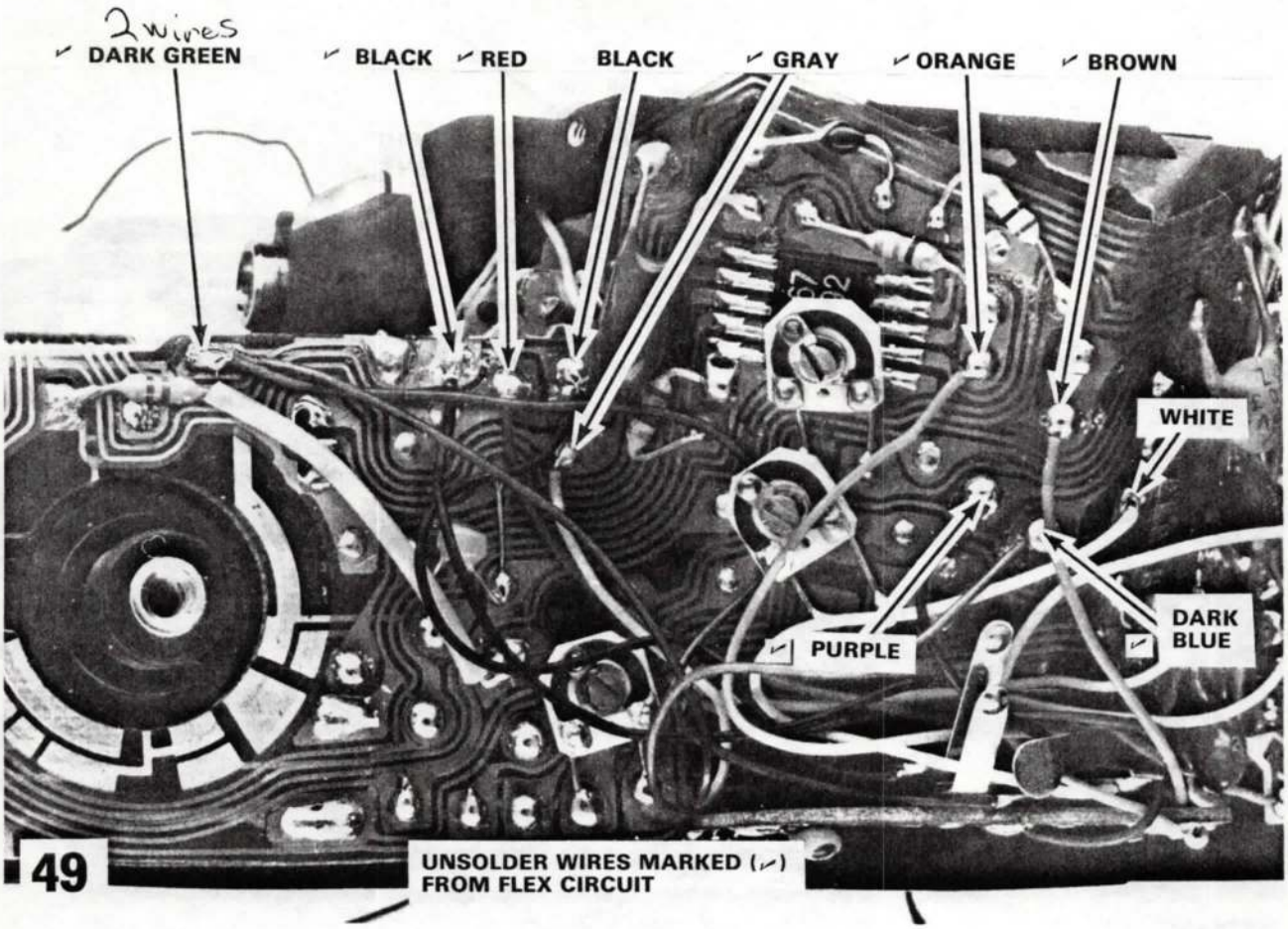
After removing the battery compartment, you can remove and replace the combination magnet Mg2. Also, you can adjust the curtain-travel times. Turn the tension-setting ratchets in a counterclockwise direction to increase the tension. To let off tension, hold the pawl spring disengaged and allow the tension-setting ratchet to turn in a clockwise direction. Minolta's recommended travel time is 11ms for both curtains.



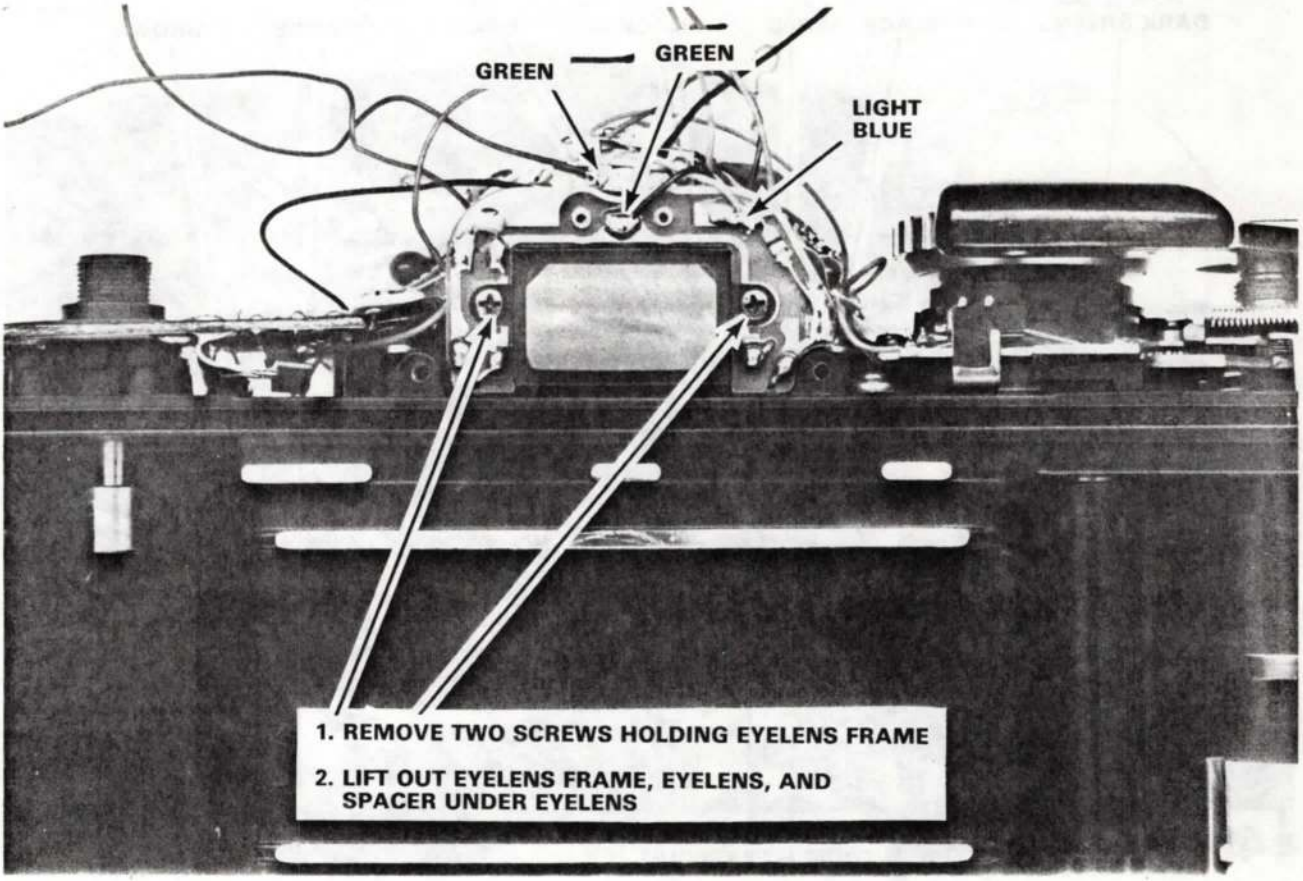
47 Shutter cocked

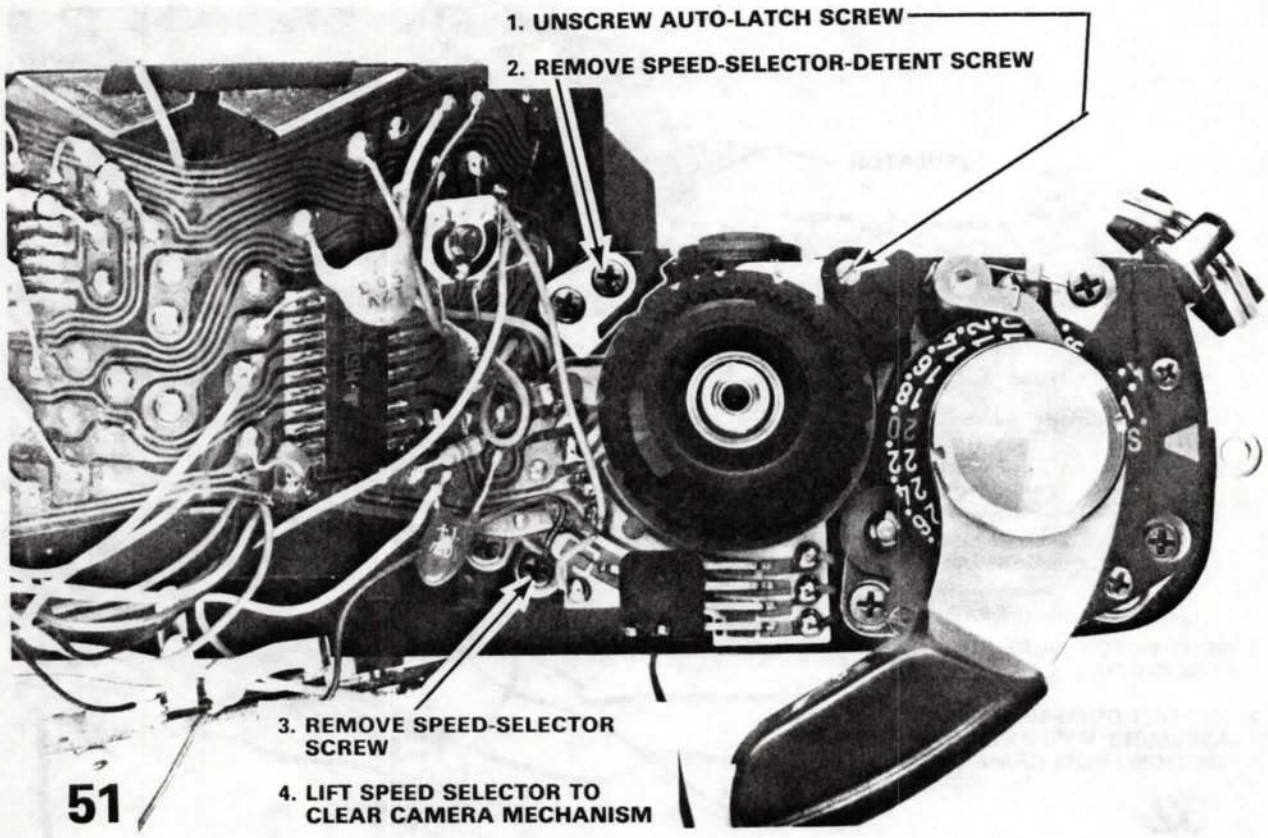


UNSOLDER WIRES MARKED (⌐) FROM FLEX CIRCUIT

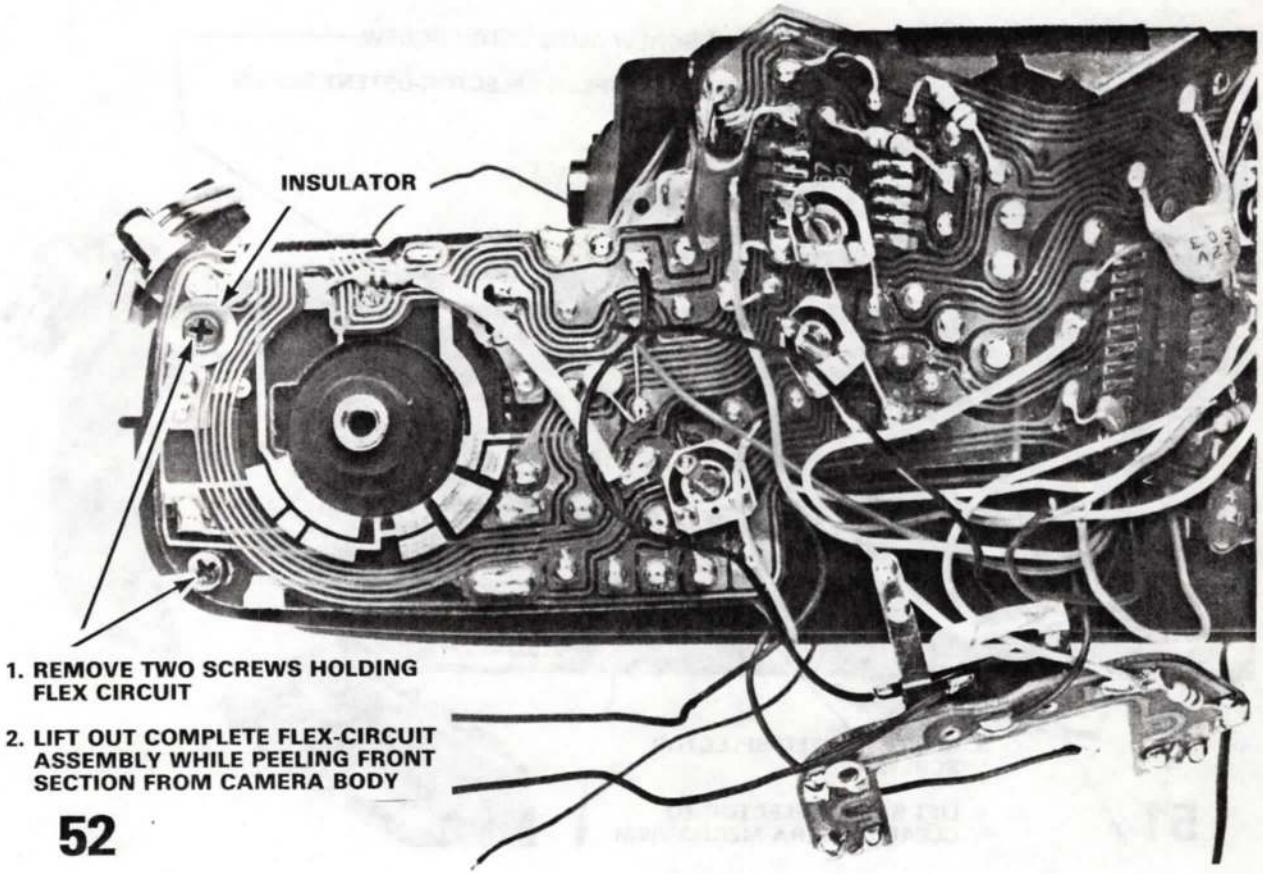


49 UNSOLDER WIRES MARKED (✓) FROM FLEX CIRCUIT

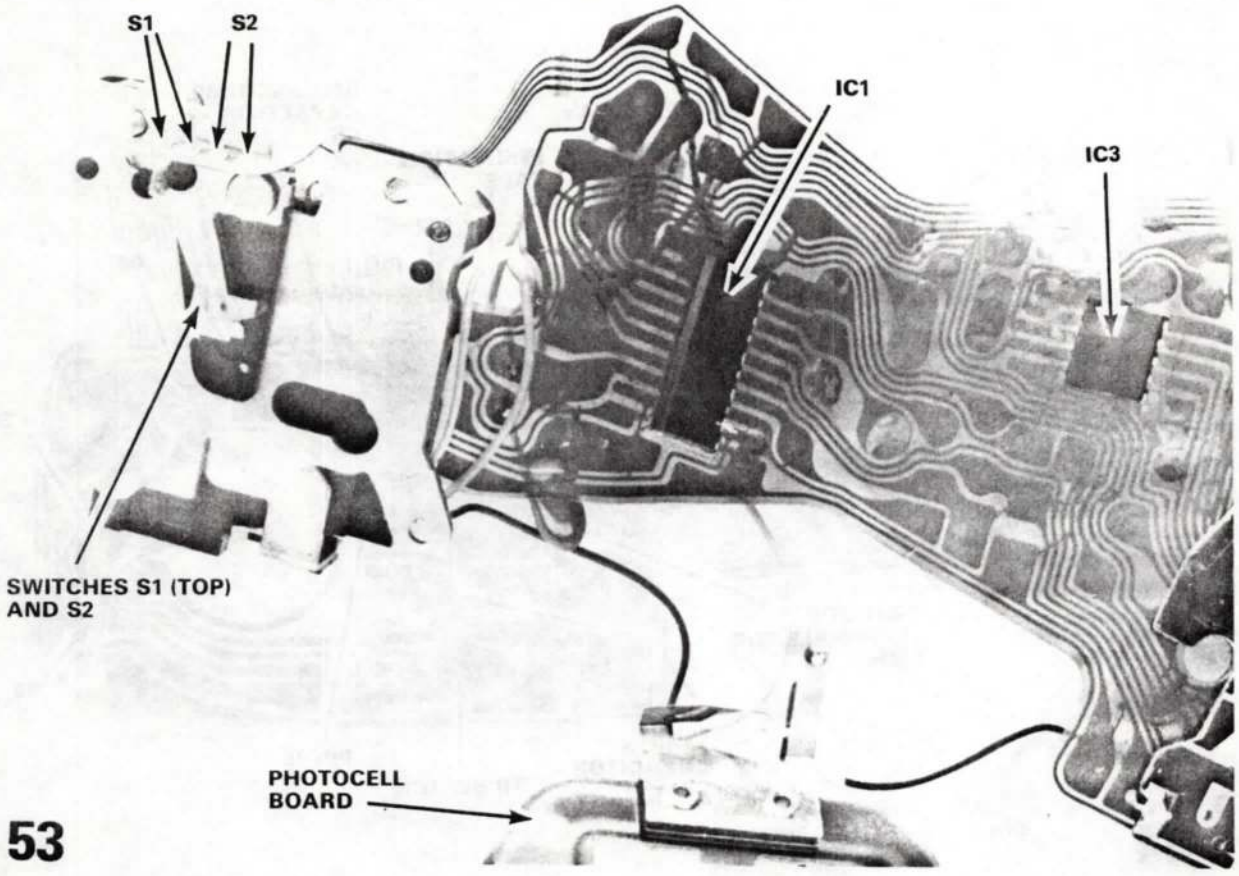

GREEN
GREEN
LIGHT
BLUE
1. REMOVE TWO SCREWS HOLDING EYELENS FRAME
2. LIFT OUT EYELENS FRAME, EYELENS, AND SPACER UNDER EYELENS


1. UNSCREW AUTO-LATCH SCREW
2. REMOVE SPEED-SELECTOR-DETENT SCREW
3. REMOVE SPEED-SELECTOR SCREW
4. LIFT SPEED SELECTOR TO CLEAR CAMERA MECHANISM

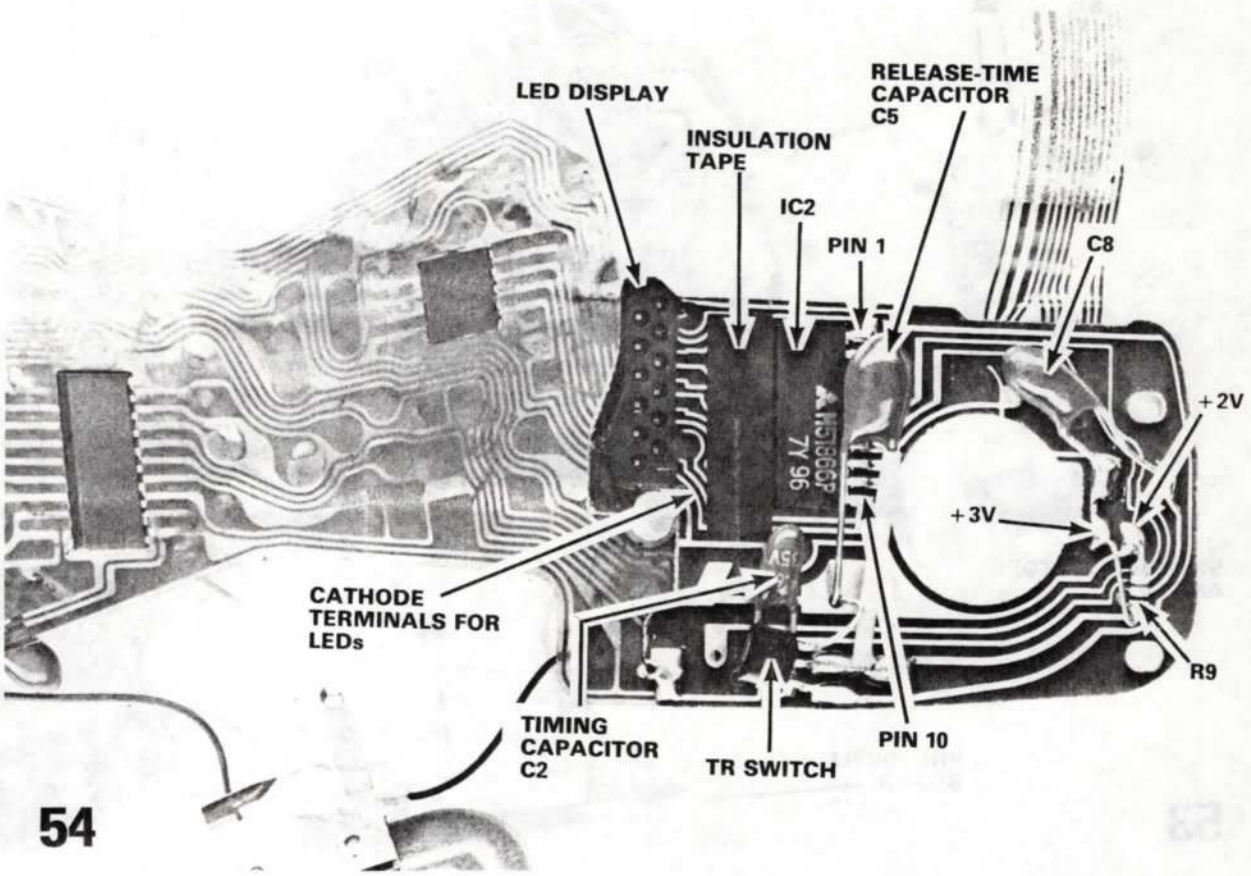
51


INSULATOR
1. REMOVE TWO SCREWS HOLDING FLEX CIRCUIT
2. LIFT OUT COMPLETE FLEX-CIRCUIT ASSEMBLY WHILE PEELING FRONT SECTION FROM CAMERA BODY
52

Notice that you can shift the position of the circuit board at the rewind end of the camera. On reassembly, loosen the two screws and shift the circuit board until you can see all the LEDs clearly. By changing the light level and rotating the diaphragm-meter ring, you should be able to turn on each LED to check its illumination.

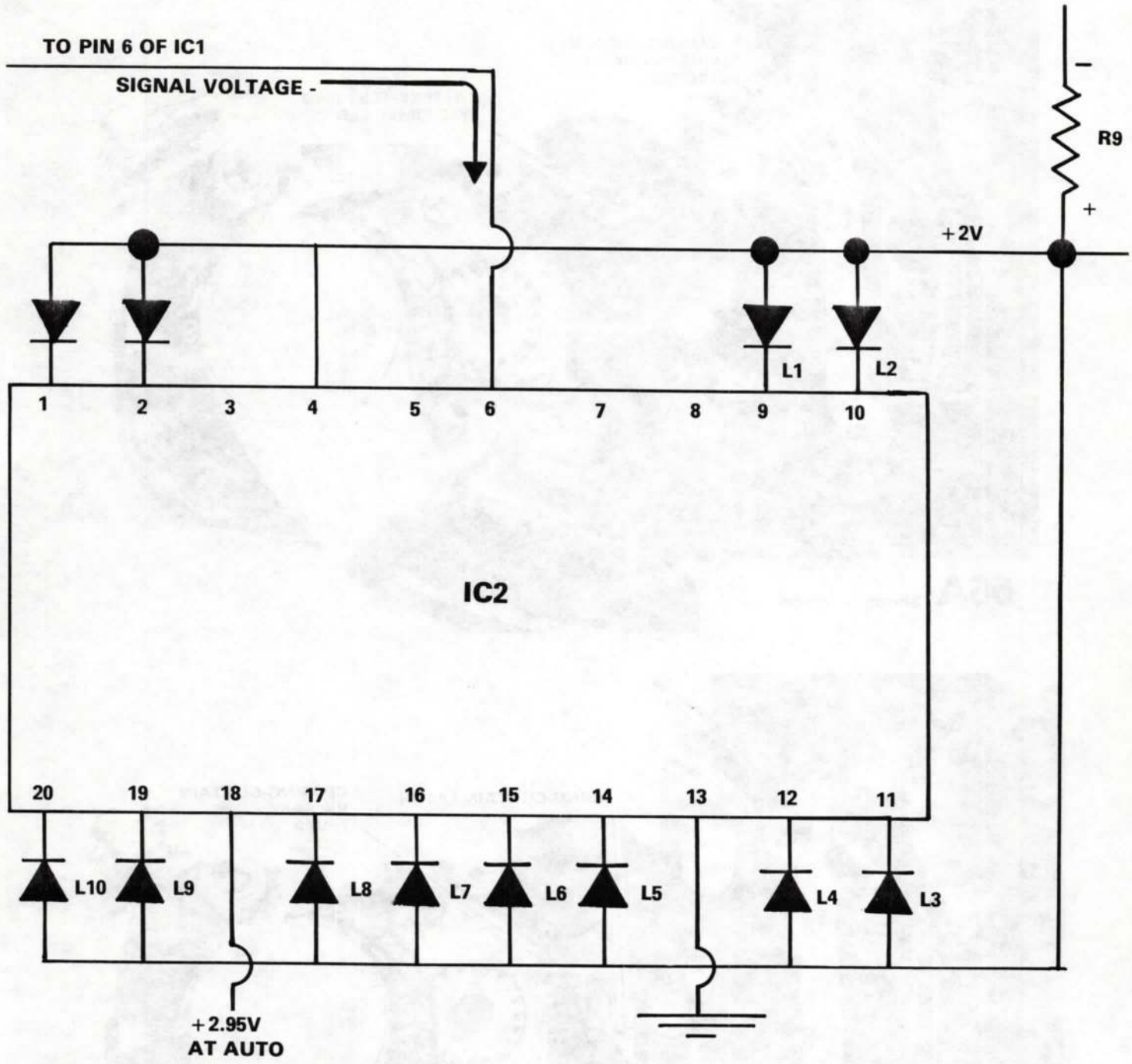


53



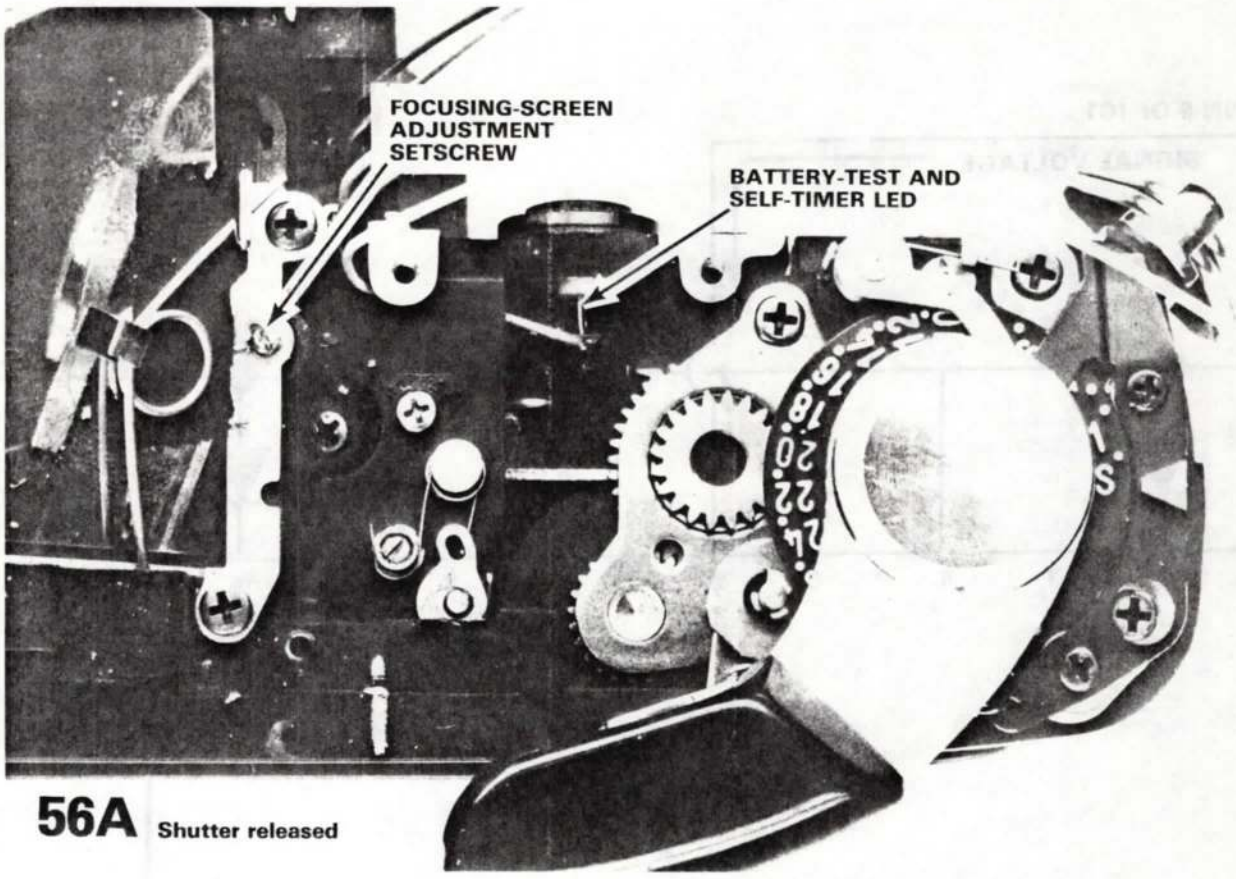
When you push the release button to close S1, IC4 applies a positive voltage of around 3V to one end of current-limiting resistor R9. The other end of R9 connects to the anode of each LED. Each LED then has approximately 2V at its anode. The cathode of each LED connects to a comparator output of IC2.

You can use a DC power supply to check the LEDs. Connect the positive power-supply lead to R9 (the end marked +3V in this illustration). Then touch the negative power-supply lead to each LED cathode terminal. At a power-supply setting of 3V, you should be able to light each LED by touching its cathode terminal with the negative power-supply lead.

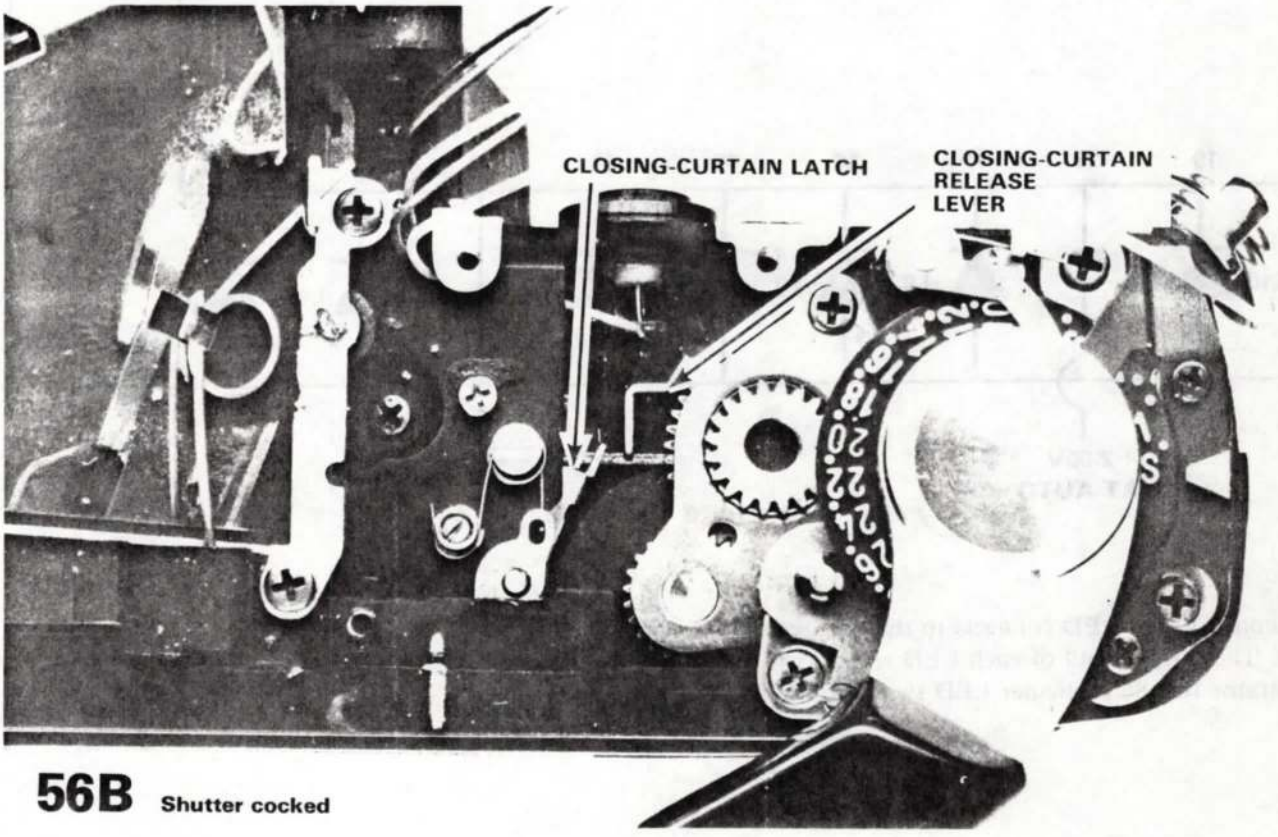


55

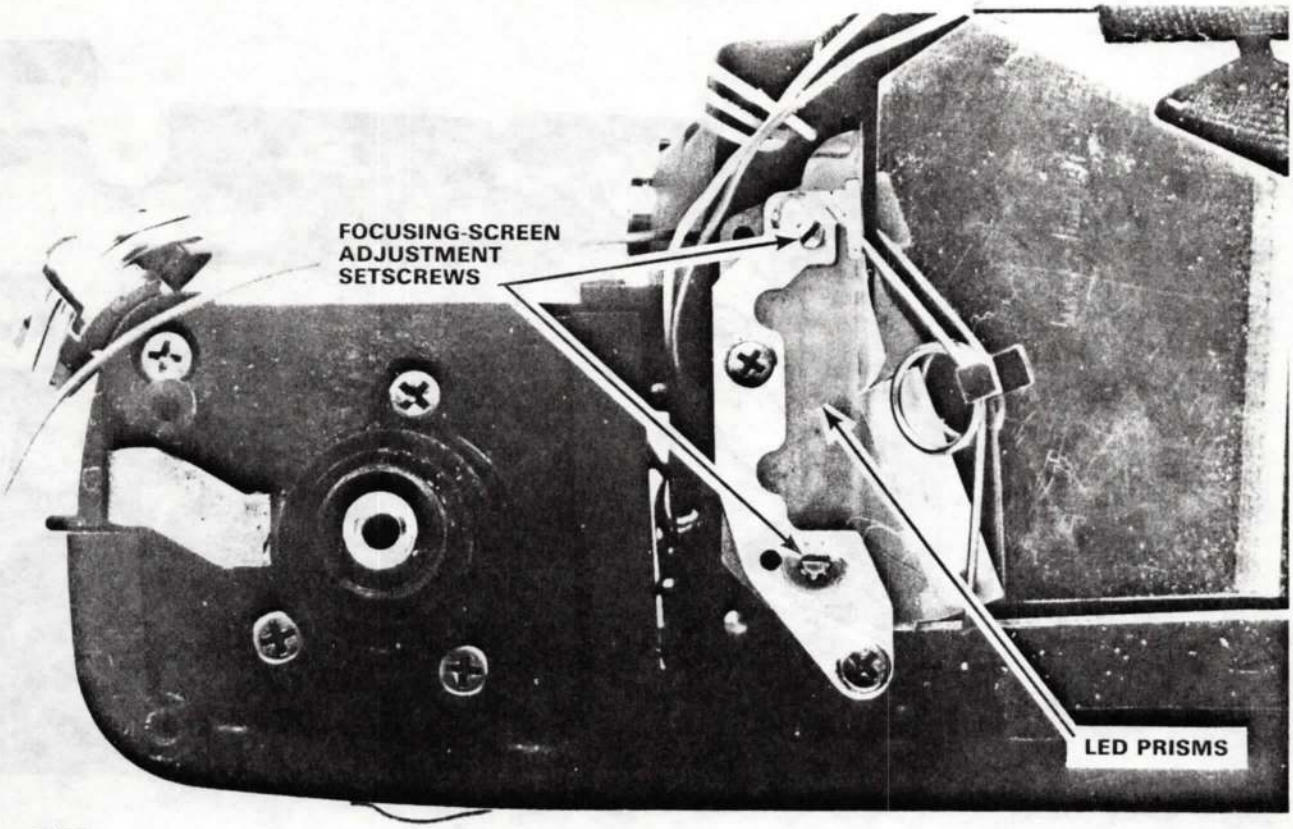
The anode of each LED connects to the positive side of resistor R9. Each LED then has a constant 2V at its anode. The cathode end of each LED connects to its own comparator stage inside IC2. When the comparator for the particular LED switches low, the LED turns on.



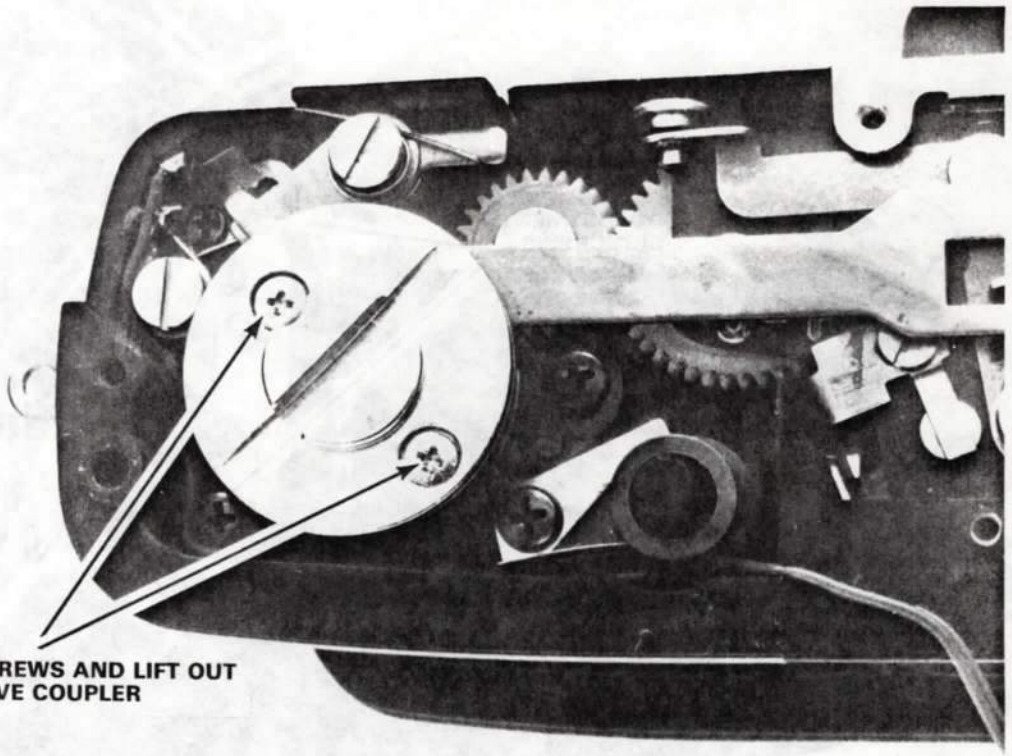
56A Shutter released



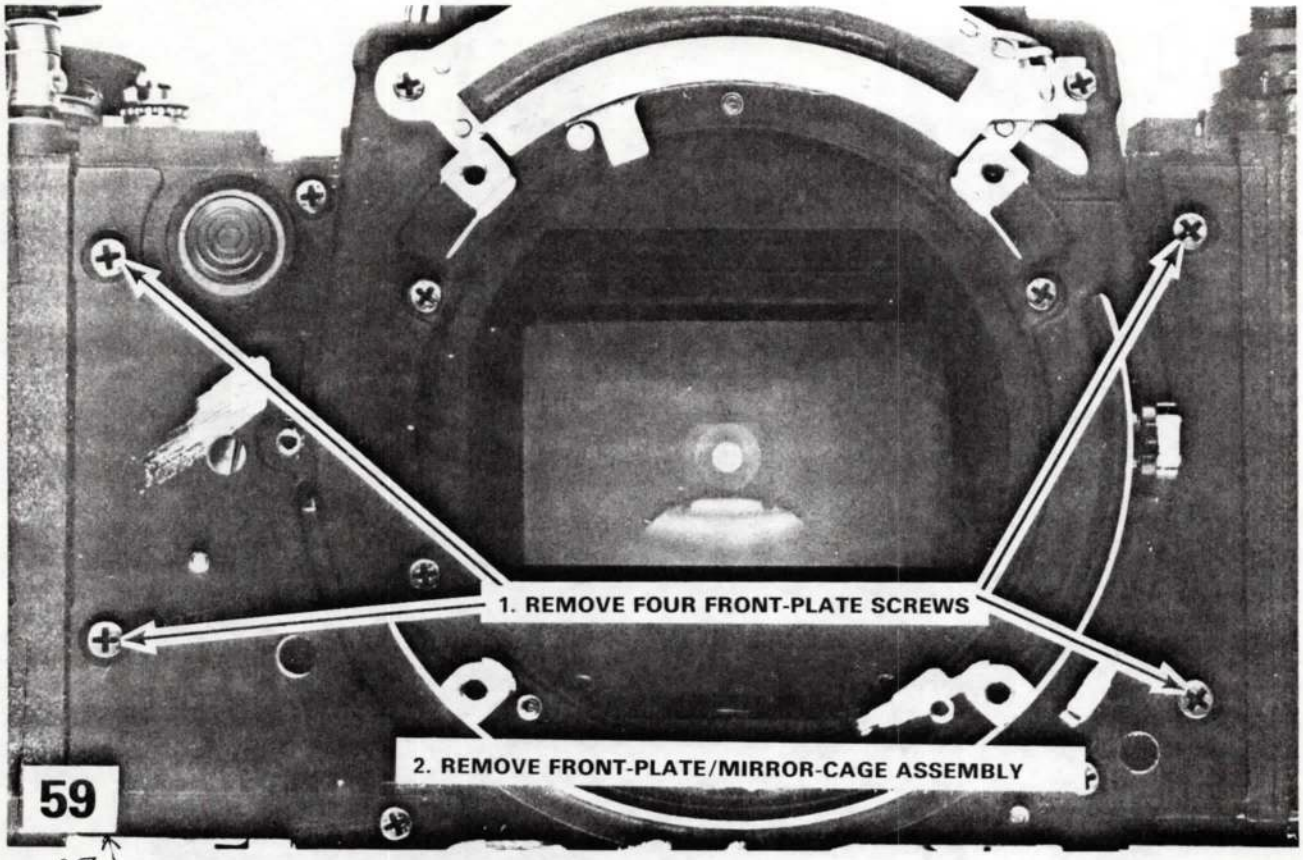
56B Shutter cocked



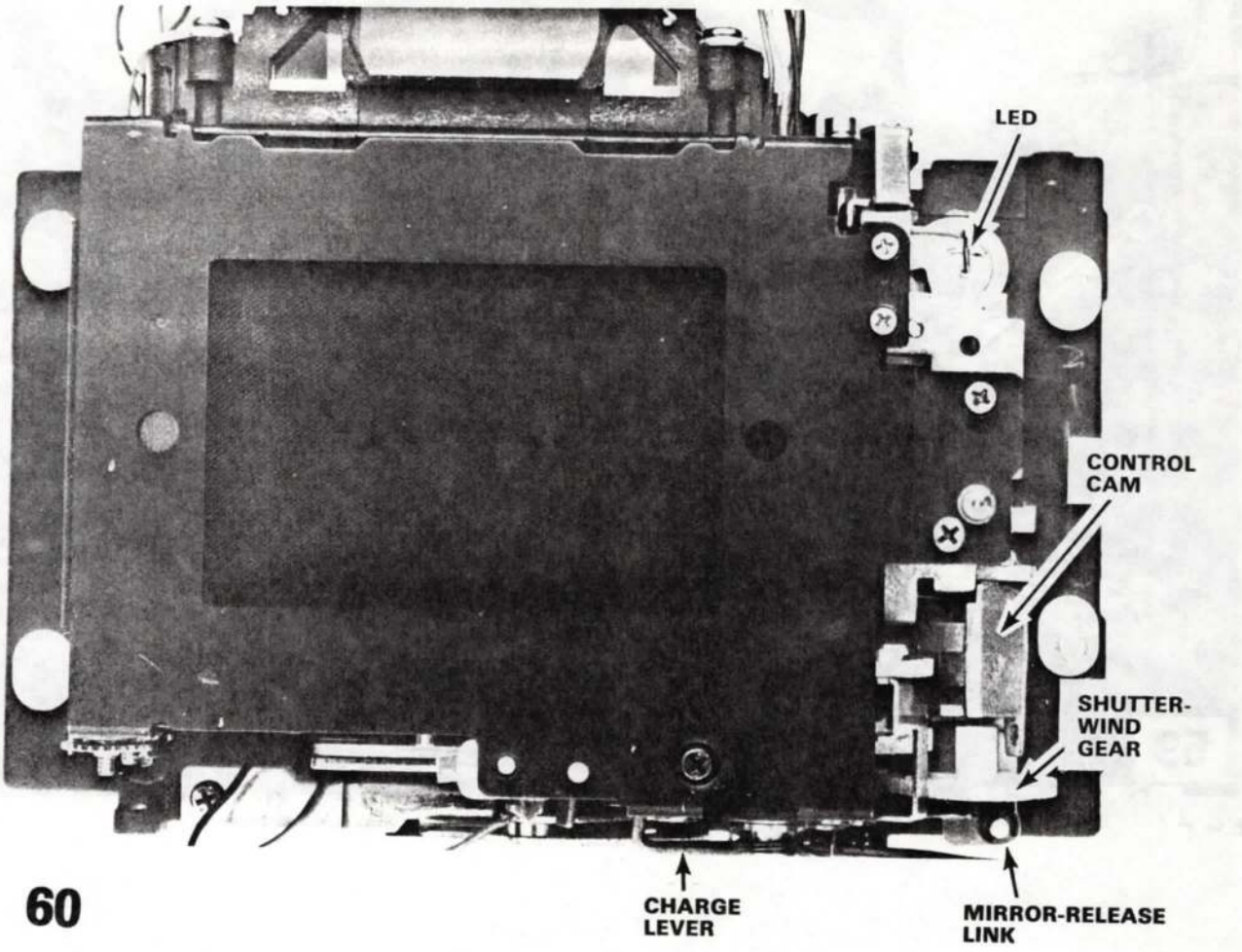
57



REMOVE SCREWS AND LIFT OUT
MOTOR-DRIVE COUPLER

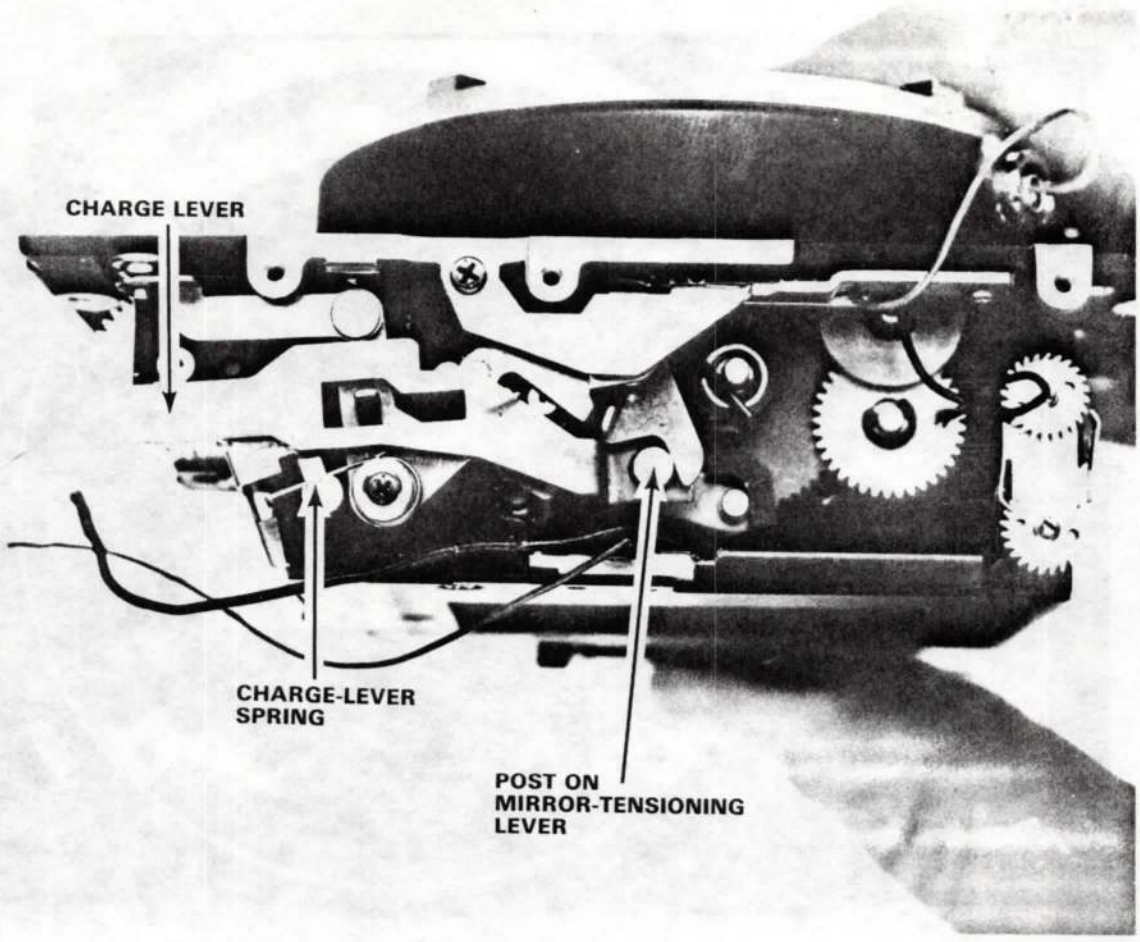

1. REMOVE FOUR FRONT-PLATE SCREWS
2. REMOVE FRONT-PLATE/MIRROR-CAGE ASSEMBLY
59

Dec. 27



60

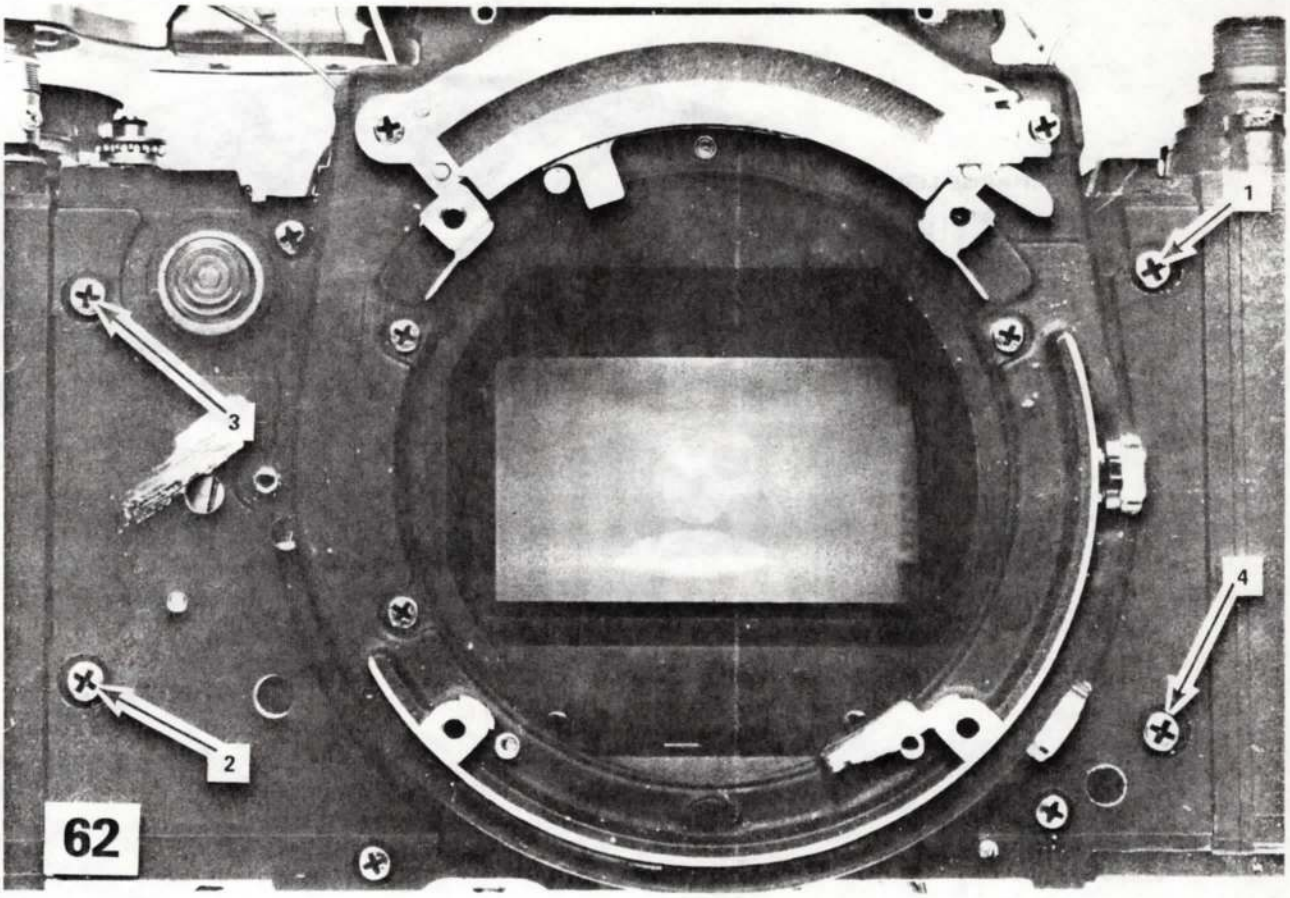
To cock the shutter, rotate the shutter-wind gear toward the control cam. Cock the mirror cage by pushing the charge lever from right to left as seen in this illustration. Release the mirror by pushing the mirror-release link from right to left.



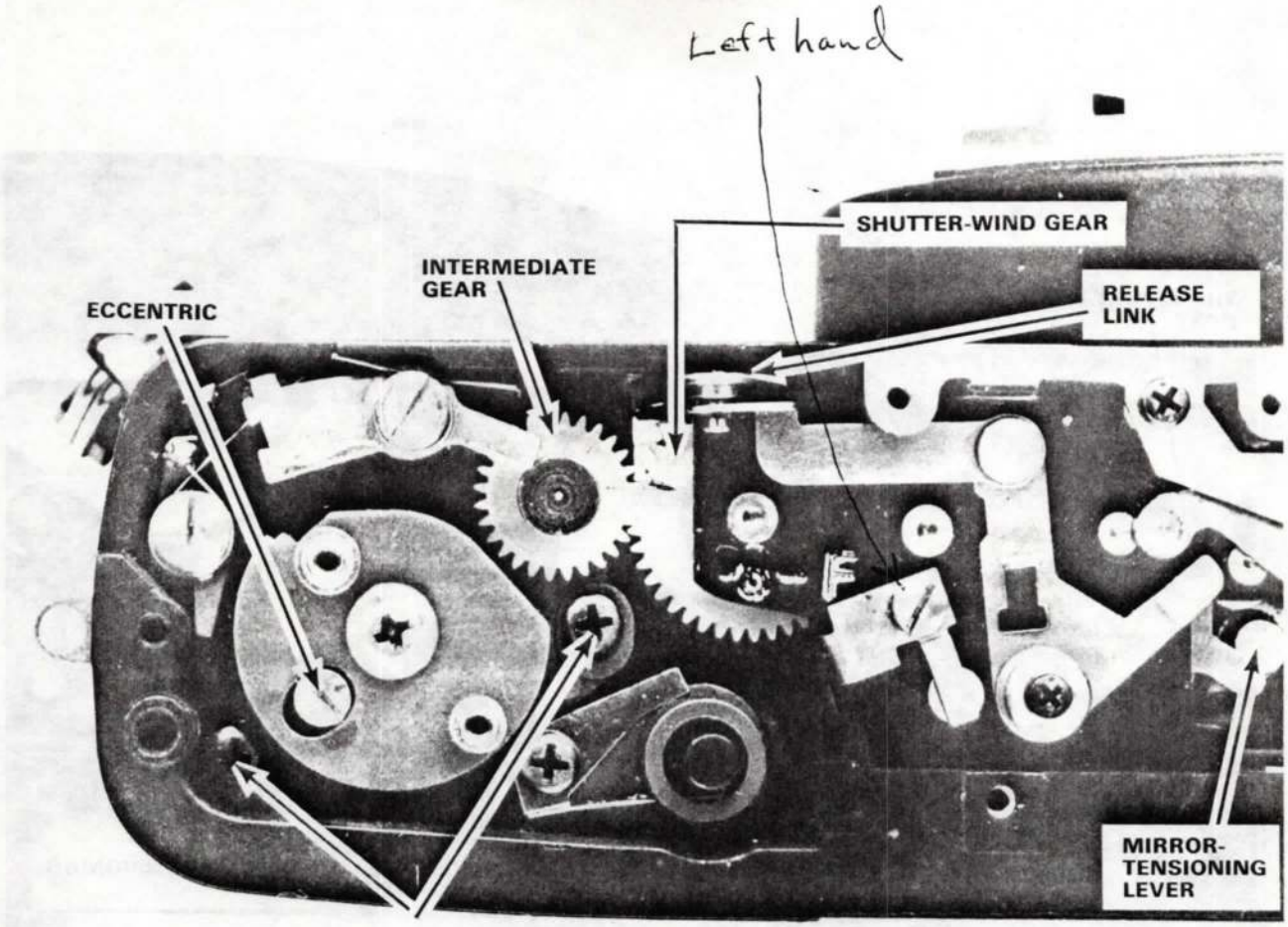
61

Replacing the Shutter/Mirror-Cage Assembly

It's easier to replace the shutter/mirror-cage assembly and to adjust the overtravel if you first remove the charge lever and the charge-lever spring. The end of the charge lever simply snaps over the post on the mirror-tensioning lever.



Make sure both the shutter and the mirror cage are in the released position. Then seat the shutter/front-plate assembly. Replace -- but don't as yet tighten -- the screws. Now, slide the shutter/front-plate assembly as far as it will go to the left. Tighten the screws in the sequence shown here.



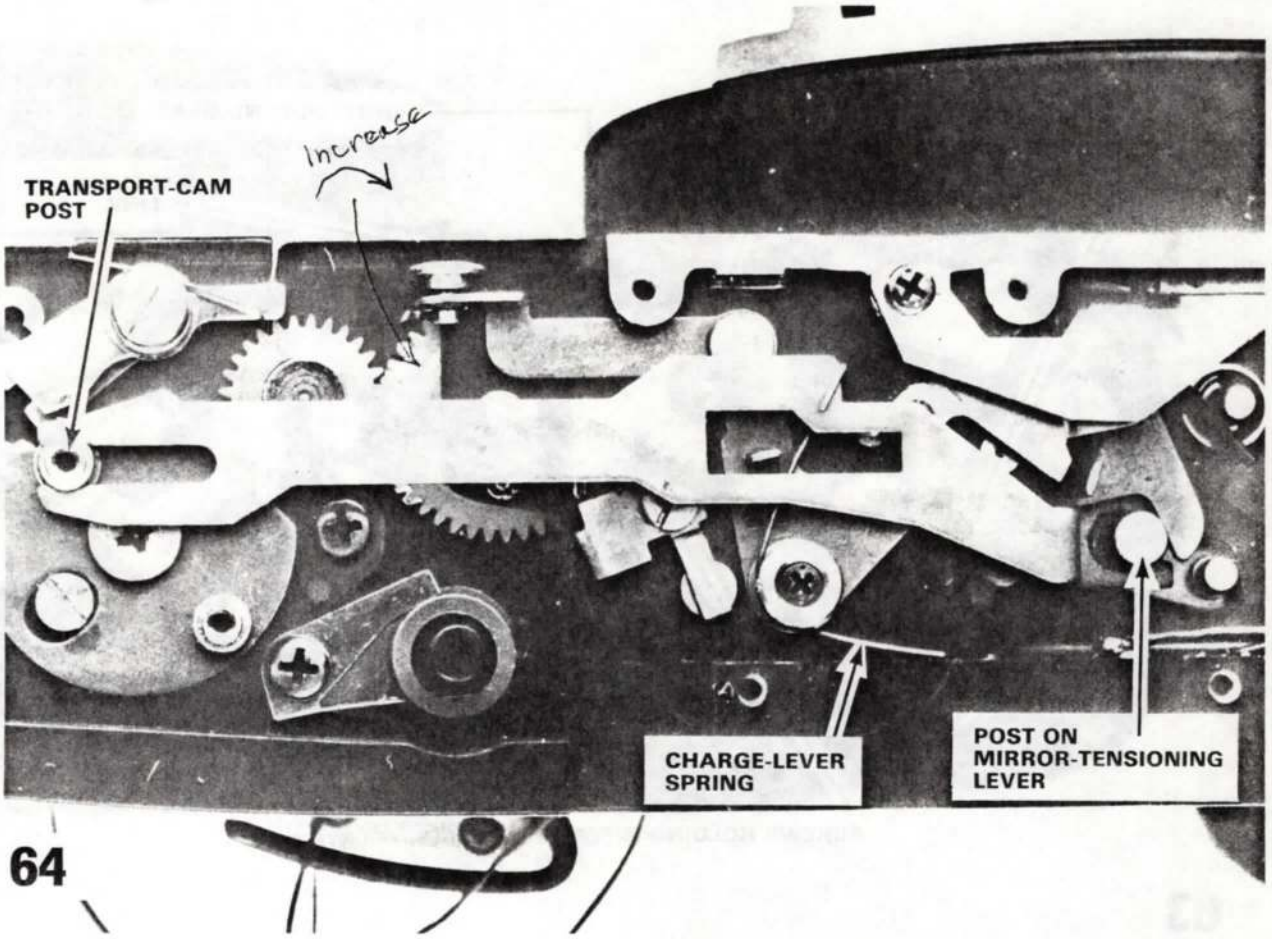
63

You can now adjust the overtravel. First loosen the two screws holding the intermediate-gear plate. Swing the intermediate-gear plate toward the front of the camera to disengage the intermediate gear from the shutter-wind gear. With the gears disengaged, rotate the shutter-wind gear until the scribe line on its top surface points to the center of the intermediate-gear mounting post.

Re-engage the intermediate gear with the shutter-wind gear and tighten the screws which hold the intermediate-gear plate. Then check the overtravel by advancing the wind lever. If the wind stroke feels hard toward the end of the wind-lever travel, the overtravel is excessive. The overtravel is insufficient if the shutter fails to cock fully.

Tension the mirror cage by pushing the mirror-tensioning lever from left to right. Then push the mirror-release link from left to right to release the mirror and shutter. If the overtravel of the cocking cycle is insufficient, the mirror may not return to the viewing position.

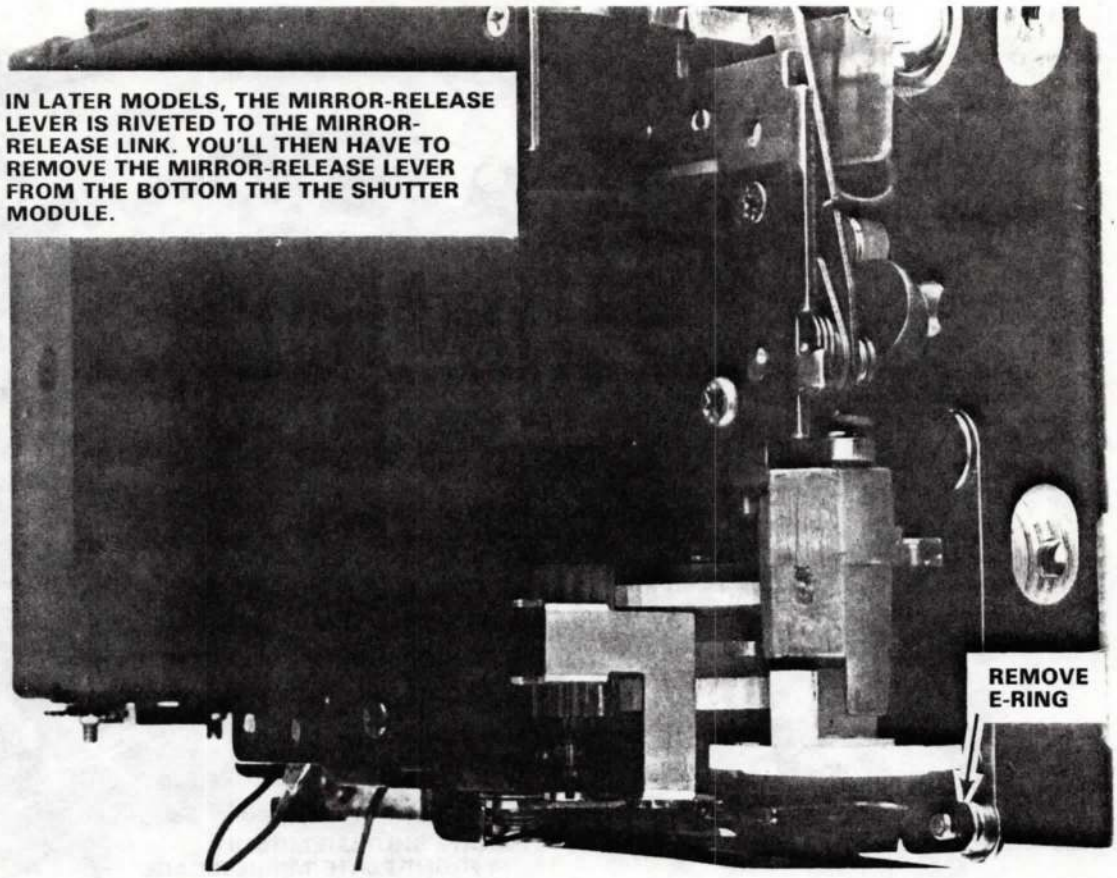
You can adjust the overtravel by turning the eccentric on the lower wind gear. Alternately, you can disengage the intermediate gear and change the position of the shutter-wind gear. Rotate the shutter-wind gear in a clockwise direction to increase the overtravel.



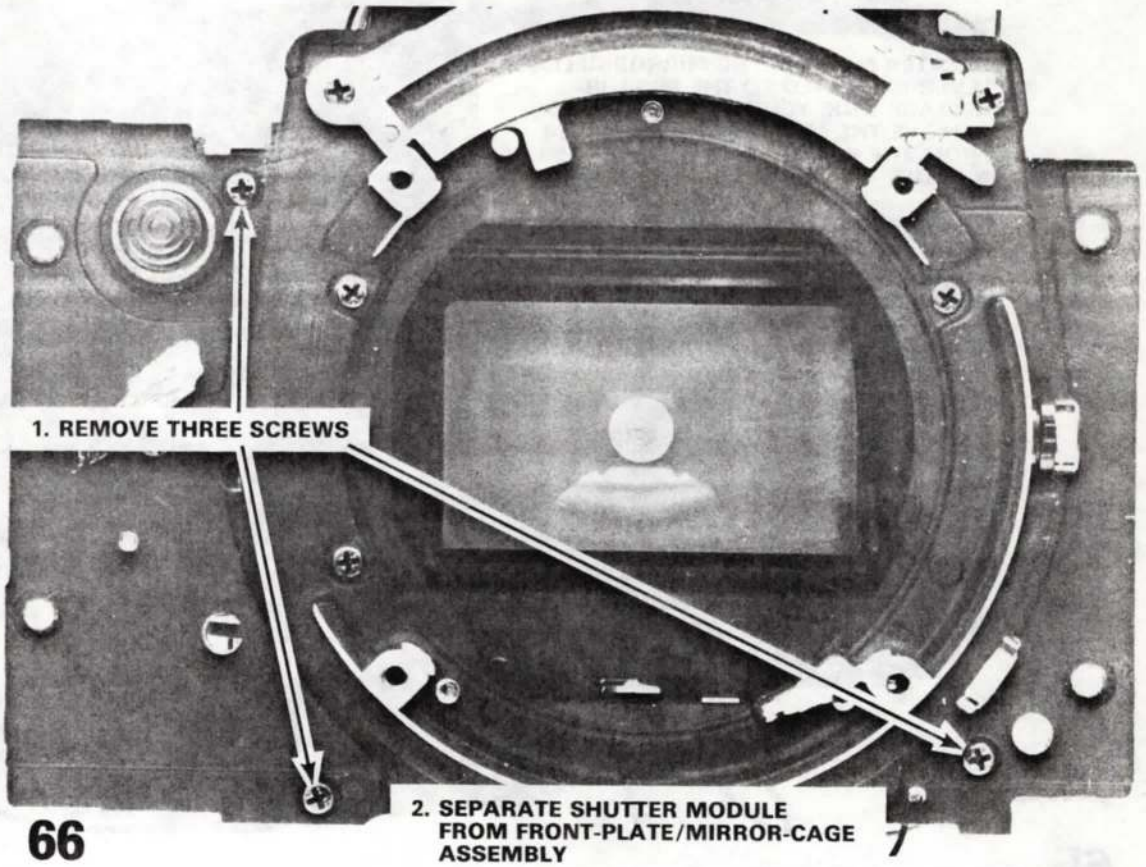
64

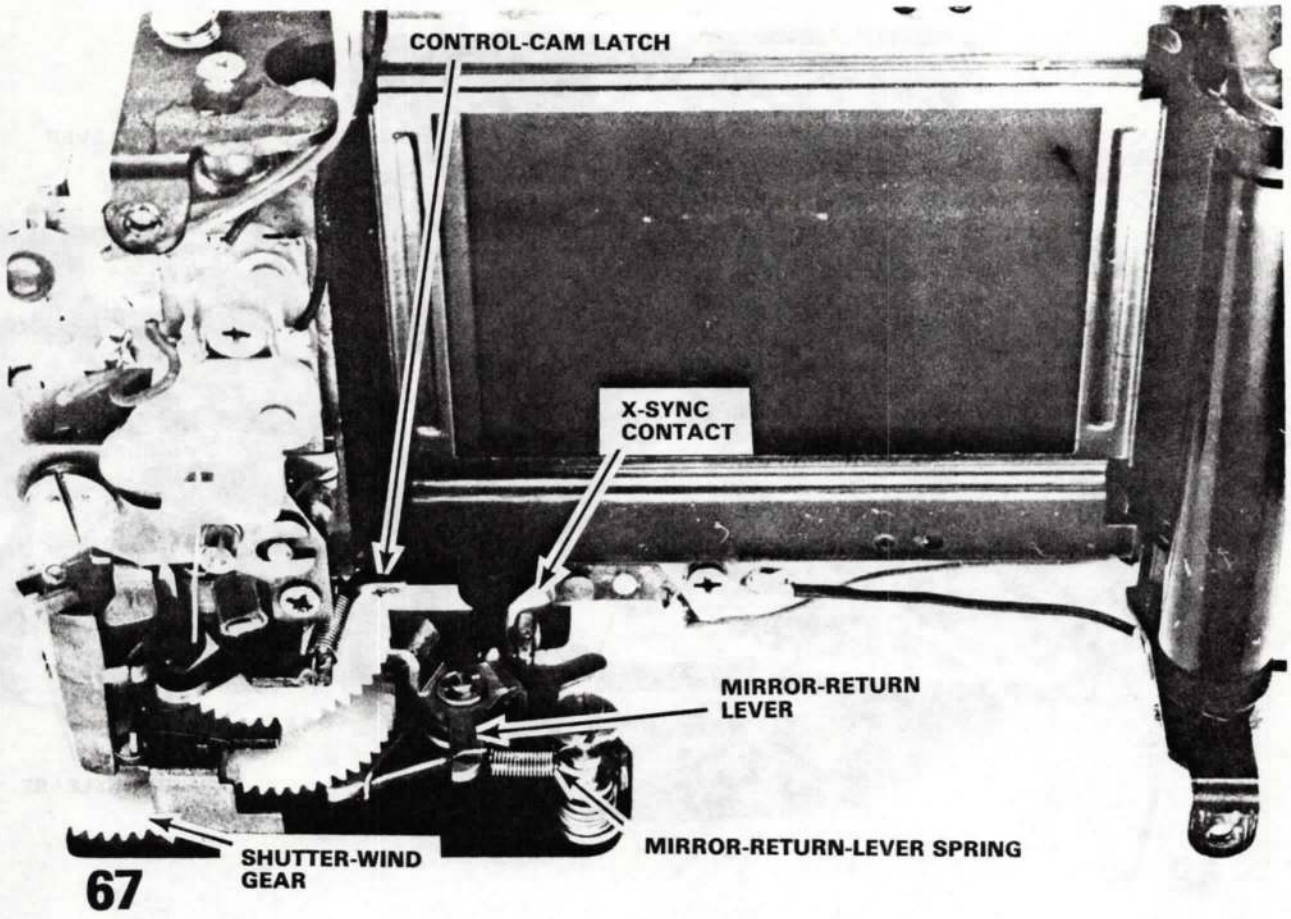
To replace the charge lever, first cock the shutter and tension the mirror cage. Then slip the forked end of the charge lever through the groove in the transport-cam post. Snap the other end of the charge lever through the slot in the mirror-tensioning-lever post. Now, release the mirror by actuating the mirror-release link. Check the cocking action by advancing the wind lever; both the mirror and the shutter should cock smoothly.

Replace the charge-lever spring by first slipping its hooked end under the charge lever. Connect the hooked end of the charge-lever spring to the step in the side of the charge lever as shown here. Then seat the spring coil over the bushing for the mirror-release lever. Pull the other end of the charge-lever spring in a counterclockwise direction until you can seat it against the side of the camera body.


IN LATER MODELS, THE MIRROR-RELEASE LEVER IS RIVETED TO THE MIRROR-RELEASE LINK. YOU'LL THEN HAVE TO REMOVE THE MIRROR-RELEASE LEVER FROM THE BOTTOM THE THE SHUTTER MODULE.
REMOVE E-RING

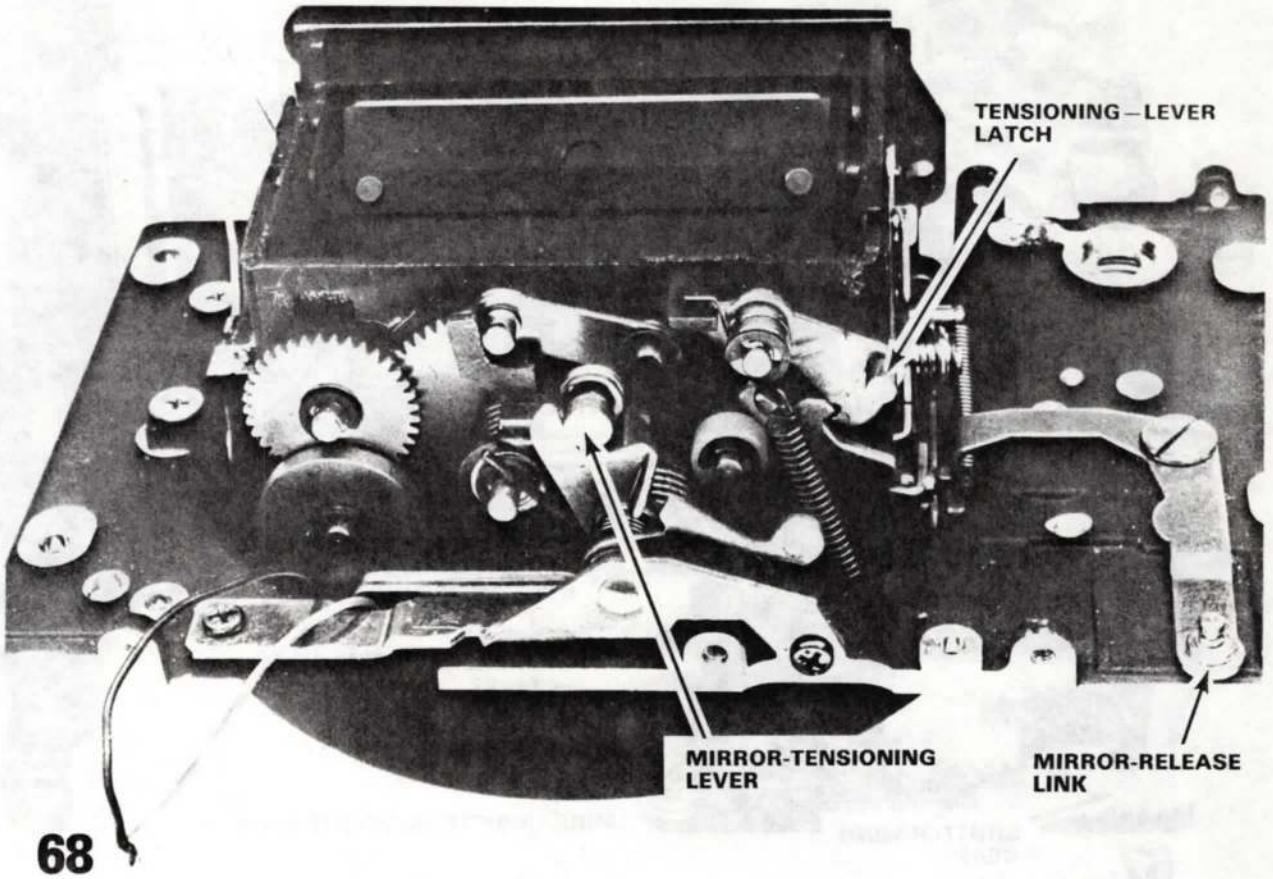
65 **Separating the shutter from the mirror cage**


1. REMOVE THREE SCREWS
2. SEPARATE SHUTTER MODULE FROM FRONT-PLATE/MIRROR-CAGE ASSEMBLY



67

To cock the shutter, rotate the shutter-wind gear. Release the shutter by pushing in the control-cam latch. If you're going to work on the shutter, you might first remove the mirror-return-lever spring. This spring sometimes has a tendency to come off on its own.



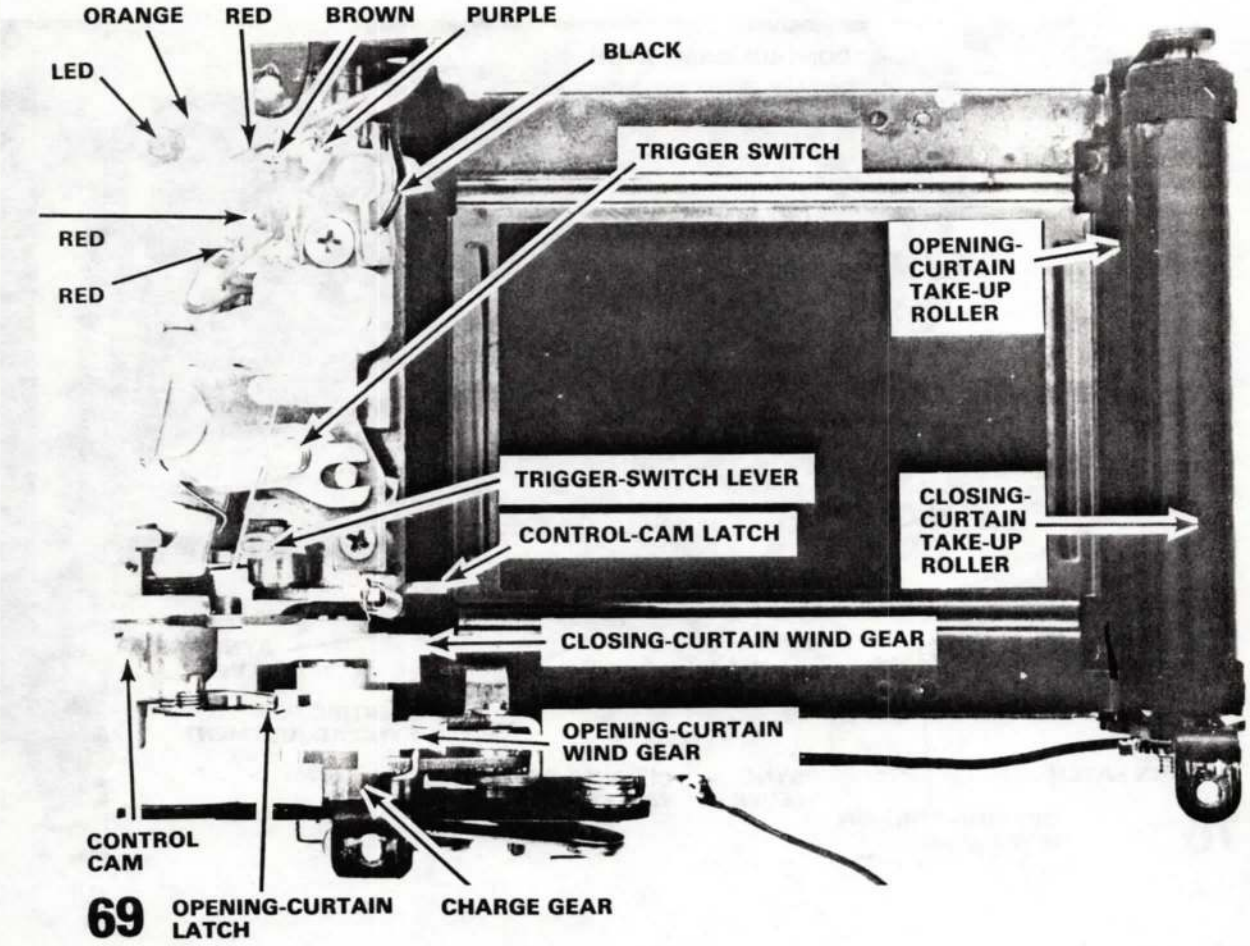
68

To cock the mirror cage, push the mirror-tensioning lever in a counterclockwise direction. Release the mirror cage by pushing the mirror-release link from right to left; the mirror should then move to the taking position. To return the mirror, push the tensioning-lever latch out of engagement with the mirror-tensioning lever. In normal operation, the mirror-return lever in the shutter disengages the tensioning-lever latch.

Before replacing the shutter, make sure that the mirror cage is in the released position with the mirror down. But the shutter should be in the cocked position. As you seat the shutter module, make sure the end of the mirror-release lever (at the bottom of the shutter) fits over the pin on the mirror-release link. Alternately, you may find it easier to replace the shutter if you first remove the mirror-release lever.

Type A silver mirror tension Lever

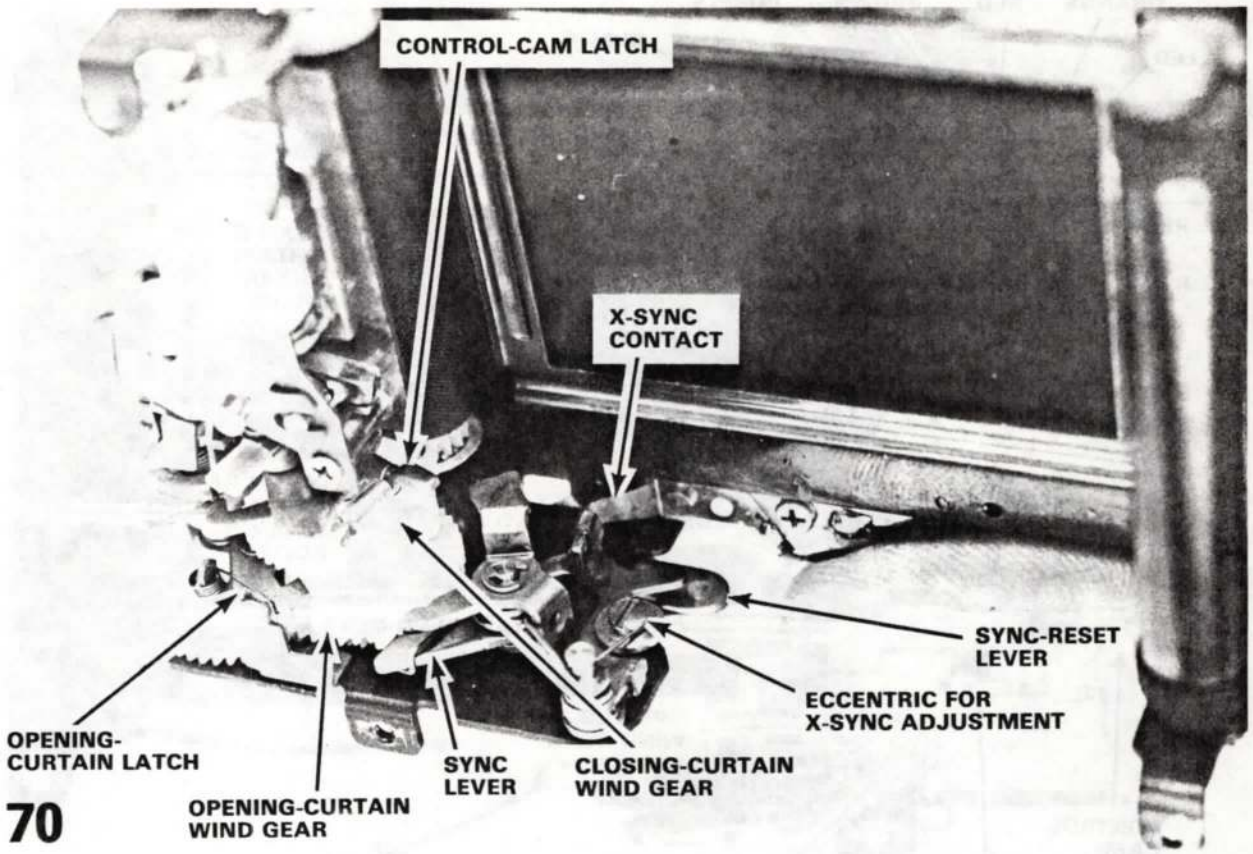
New Type B black mirror tension Lever

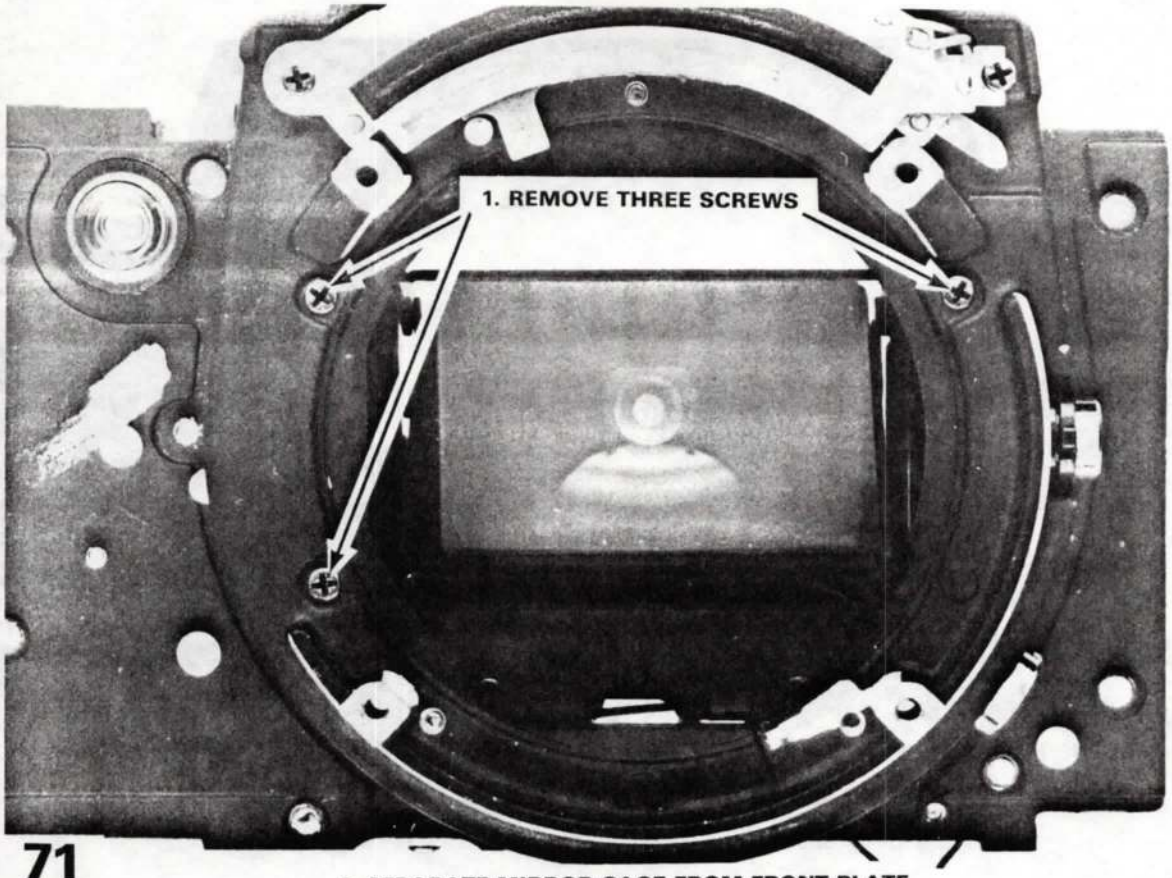


69

Type A has white plastic wind rollers and gears

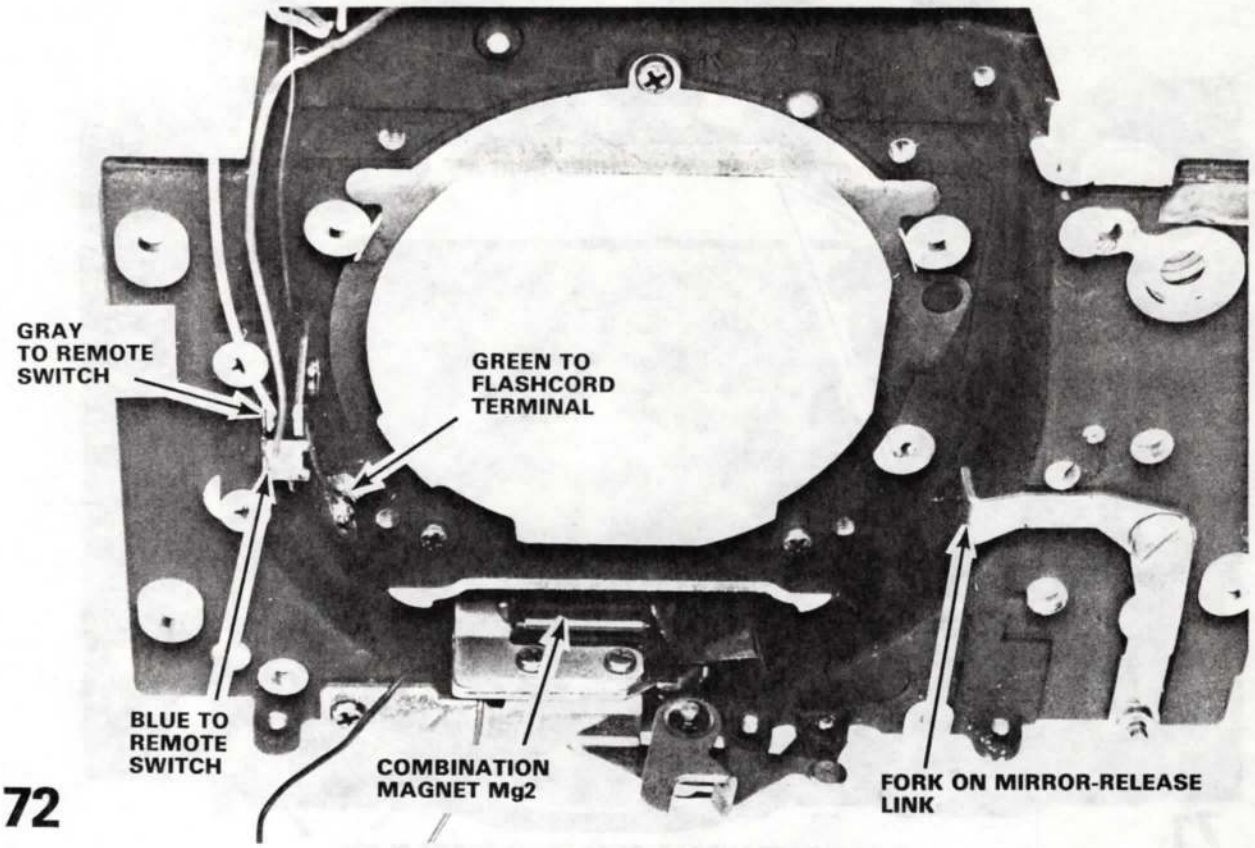
Type B has blue plastic wind rollers and gears
Brakes


CONTROL-CAM LATCH
X-SYNC CONTACT
SYNC-RESET LEVER
ECCENTRIC FOR X-SYNC ADJUSTMENT
OPENING-CURTAIN LATCH
SYNC LEVER
CLOSING-CURTAIN WIND GEAR
OPENING-CURTAIN WIND GEAR



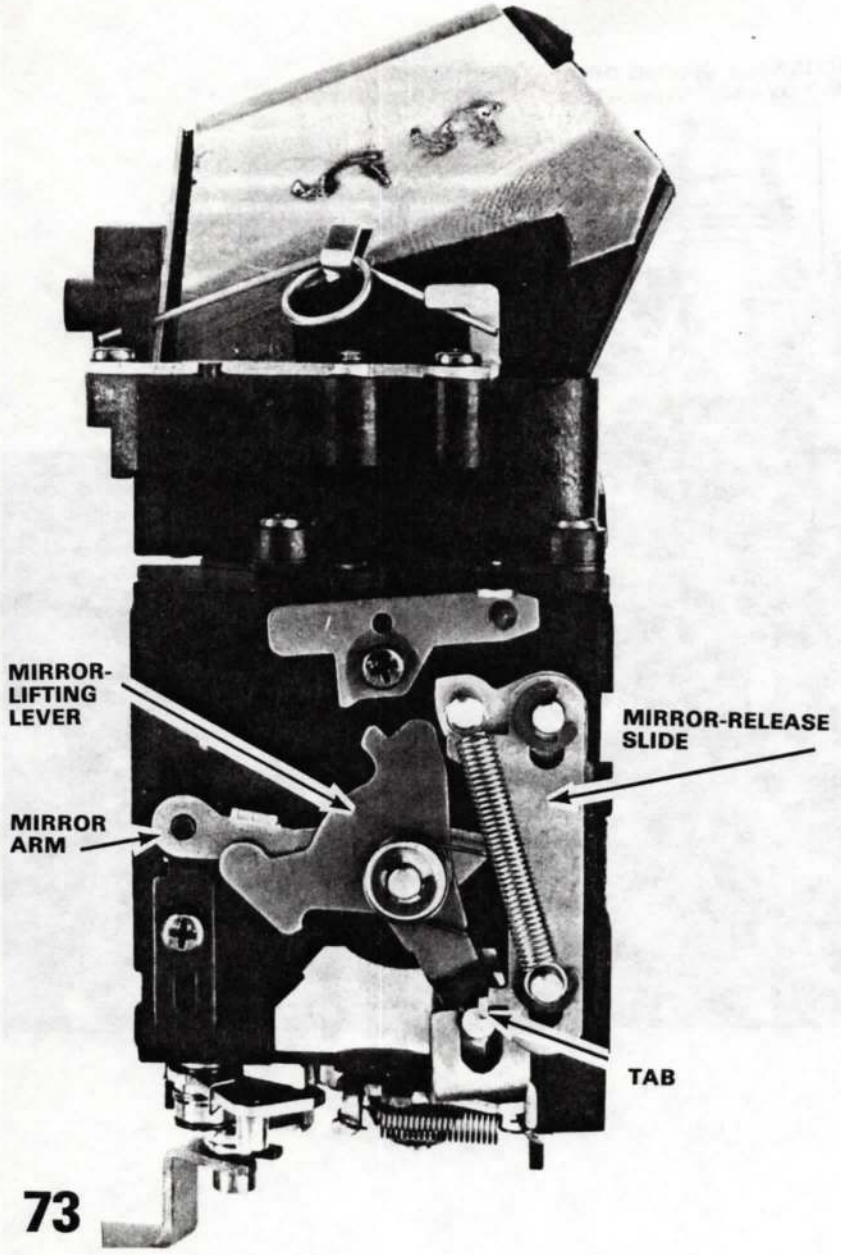
71

2. SEPARATE MIRROR CAGE FROM FRONT PLATE

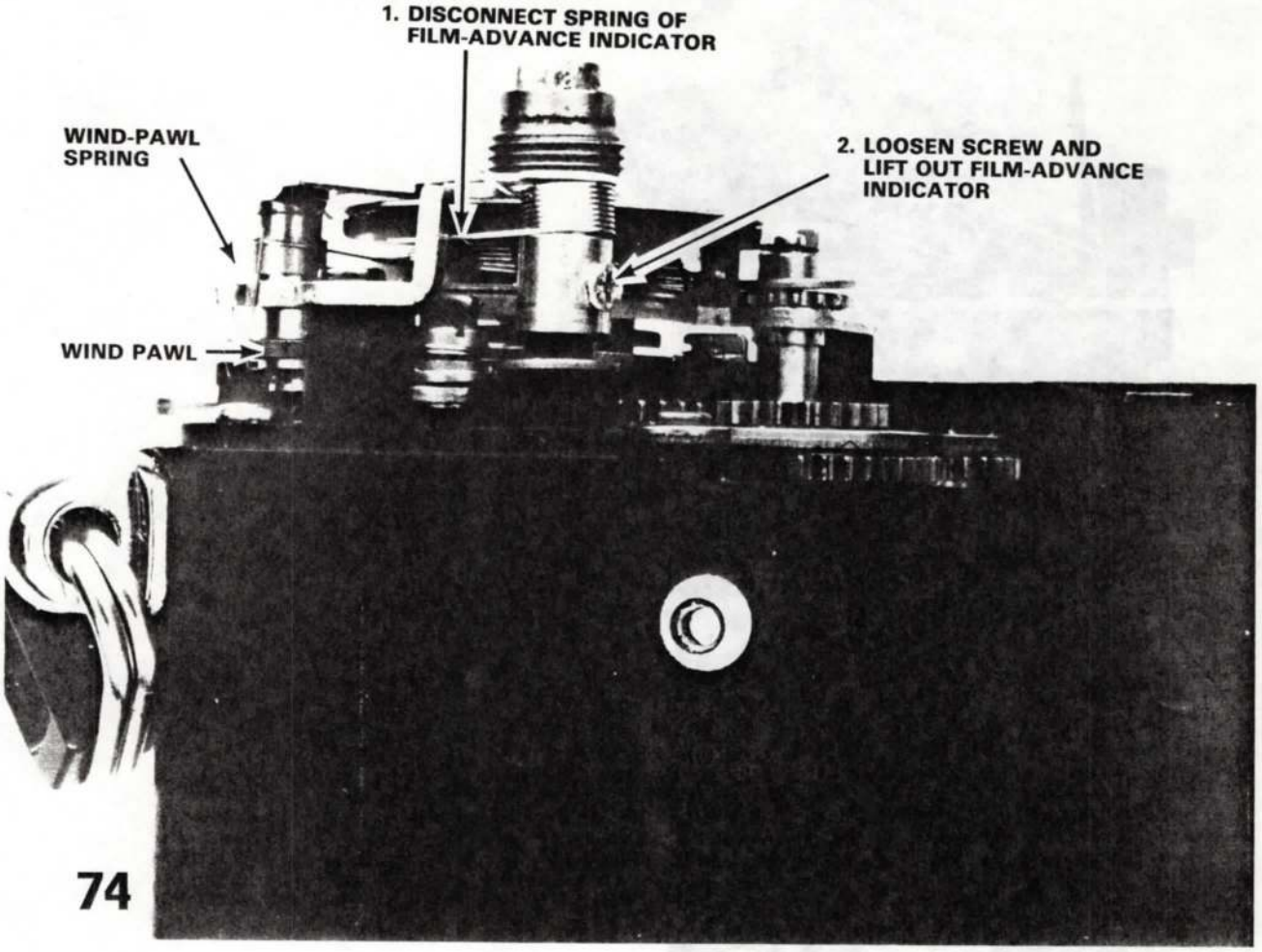


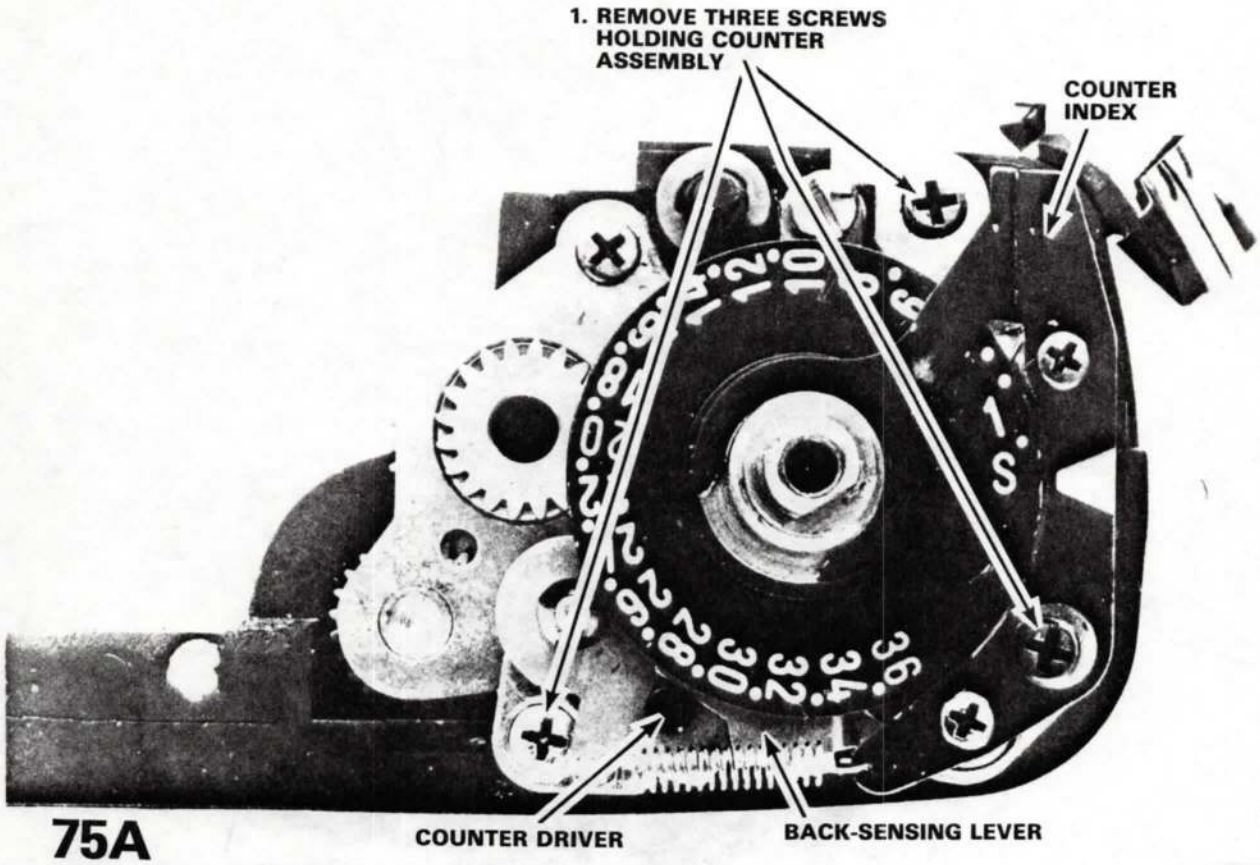
72

Mg 2 cleaned when fully assembled

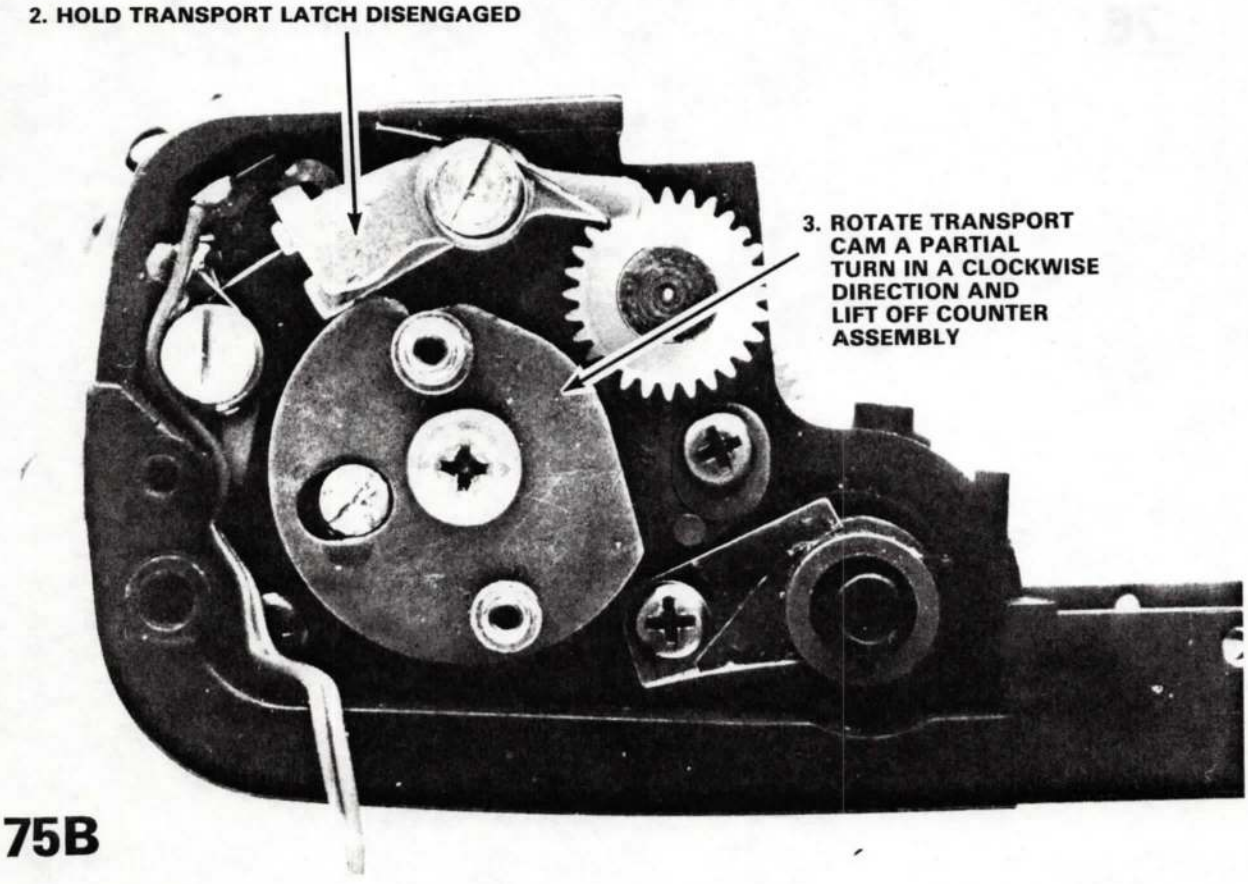


When you replace the mirror cage, make sure the tab on the mirror-release slide passes into the fork in the mirror-release link (Fig. 72).

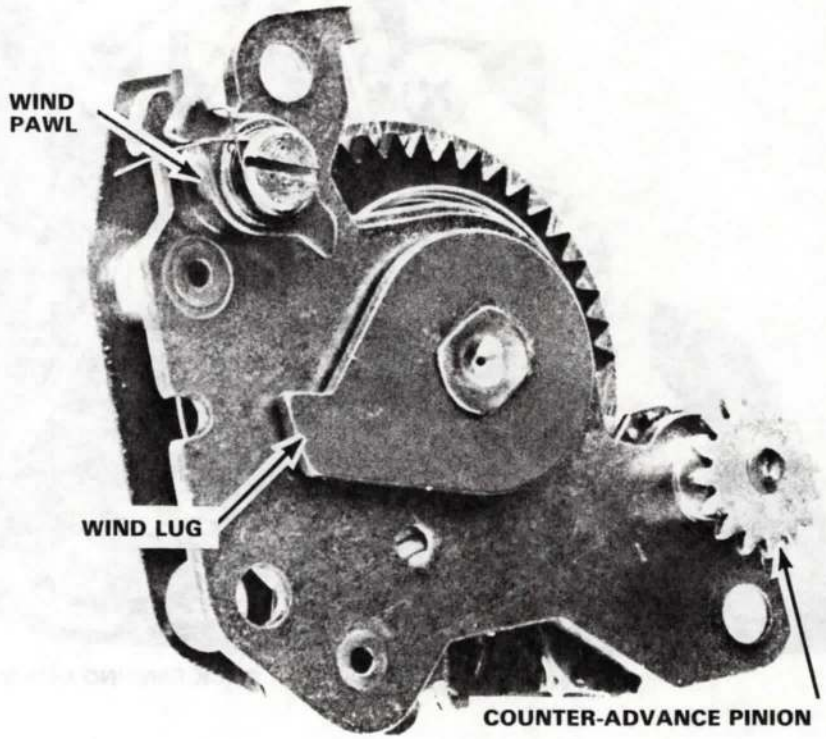

1. DISCONNECT SPRING OF FILM-ADVANCE INDICATOR
WIND-PAWL SPRING
2. LOOSEN SCREW AND LIFT OUT FILM-ADVANCE INDICATOR
WIND PAWL
74

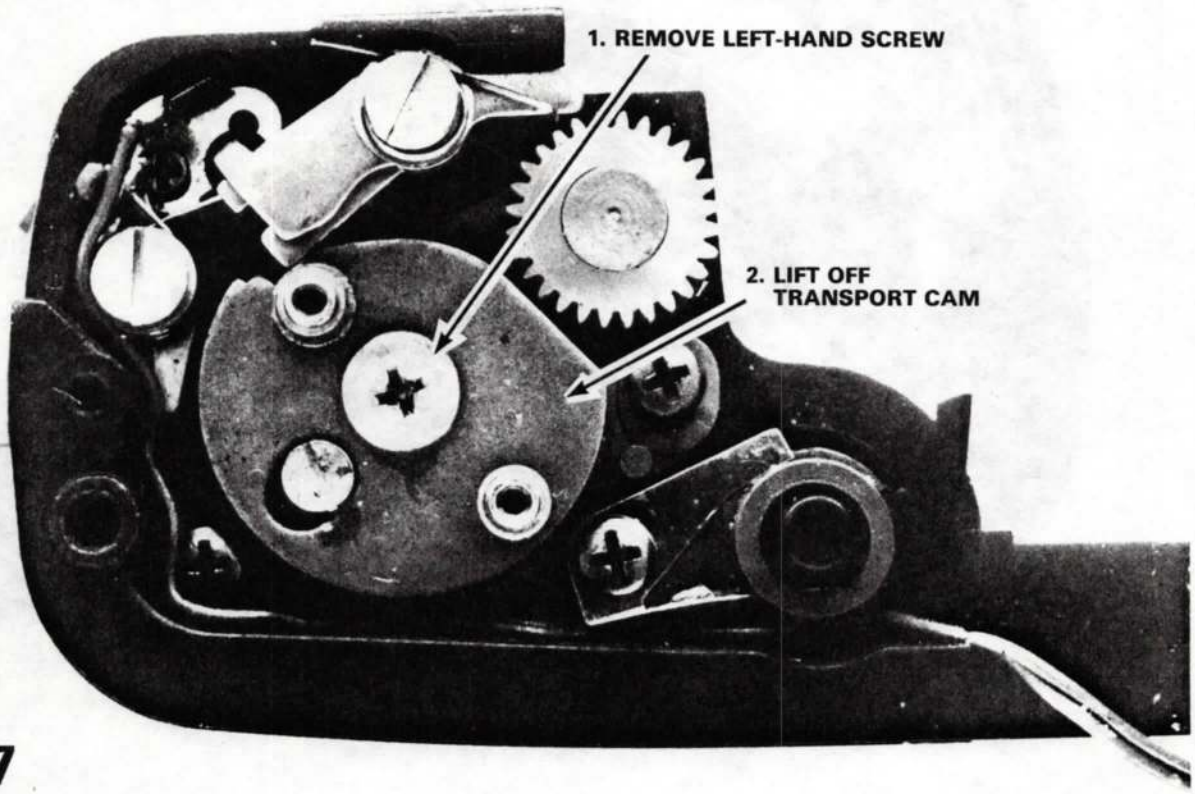

1. REMOVE THREE SCREWS HOLDING COUNTER ASSEMBLY
COUNTER INDEX
COUNTER DRIVER
BACK-SENSING LEVER

75A

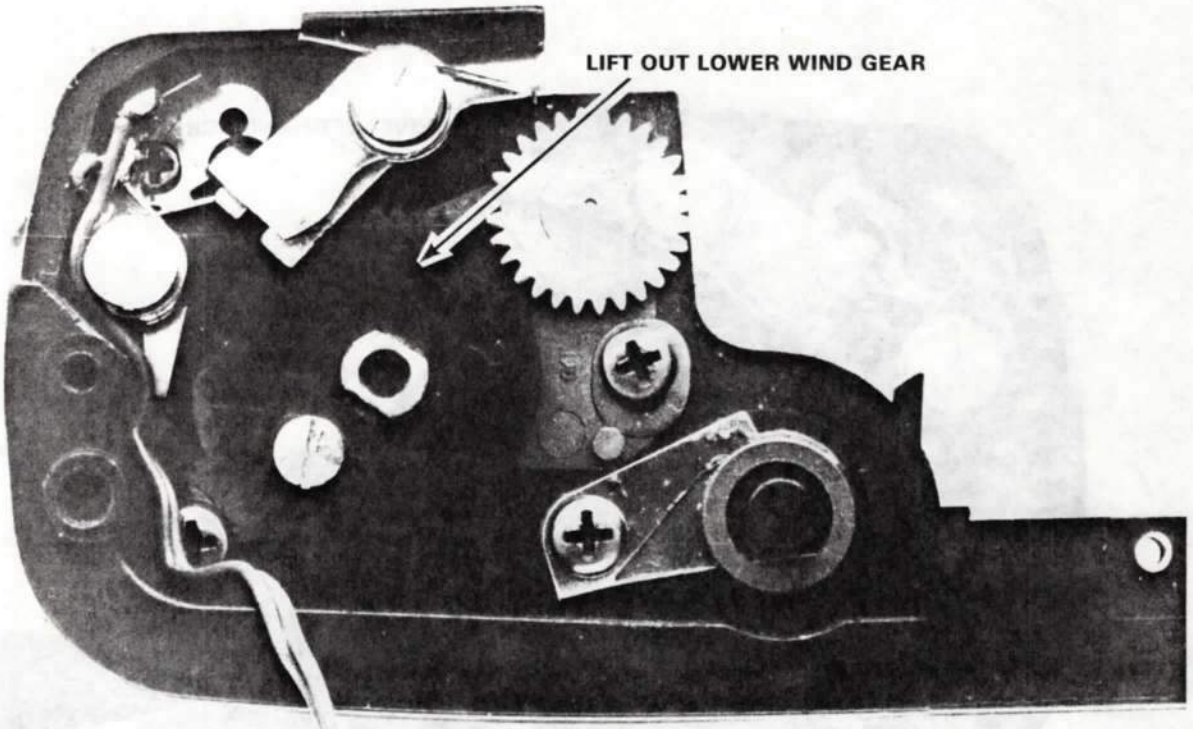

2. HOLD TRANSPORT LATCH DISENGAGED
3. ROTATE TRANSPORT CAM A PARTIAL TURN IN A CLOCKWISE DIRECTION AND LIFT OFF COUNTER ASSEMBLY

75B

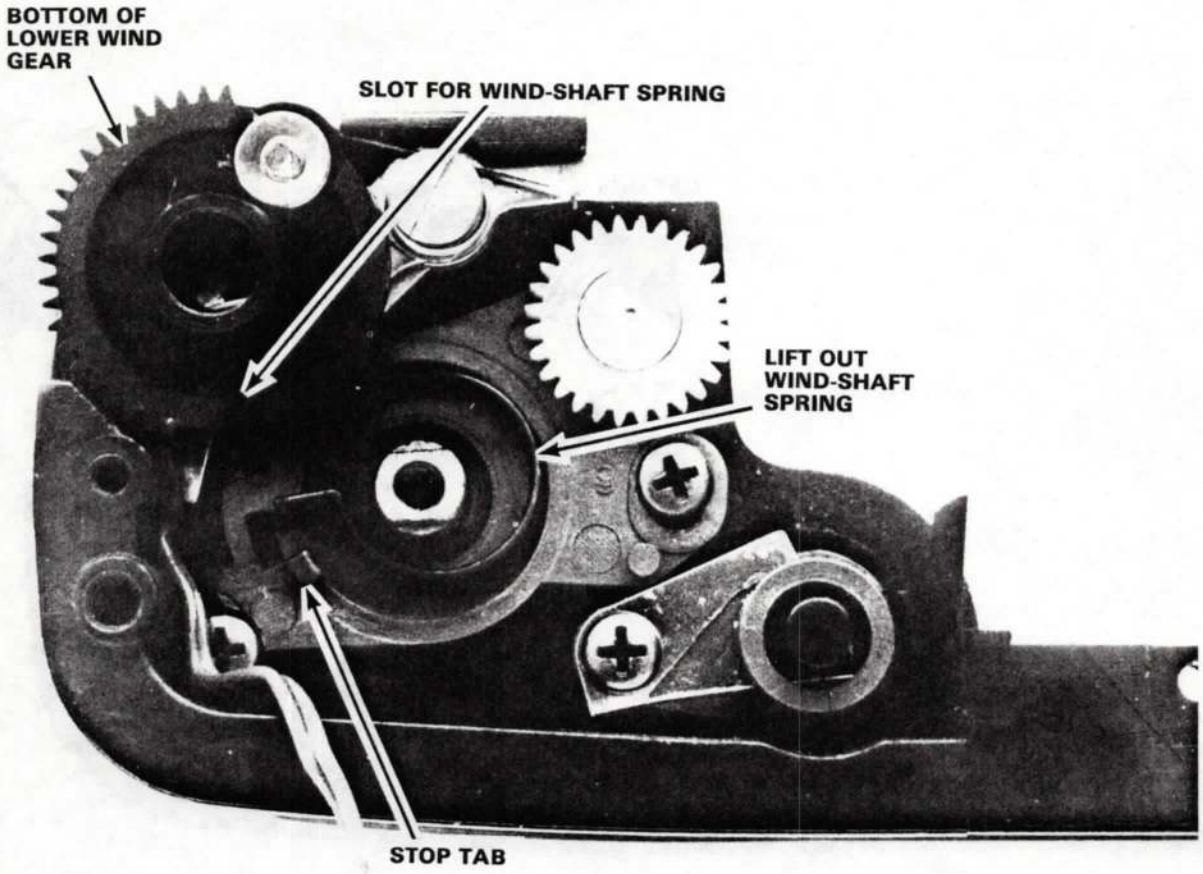

WIND
PAWL
WIND LUG
COUNTER-ADVANCE PINION



77

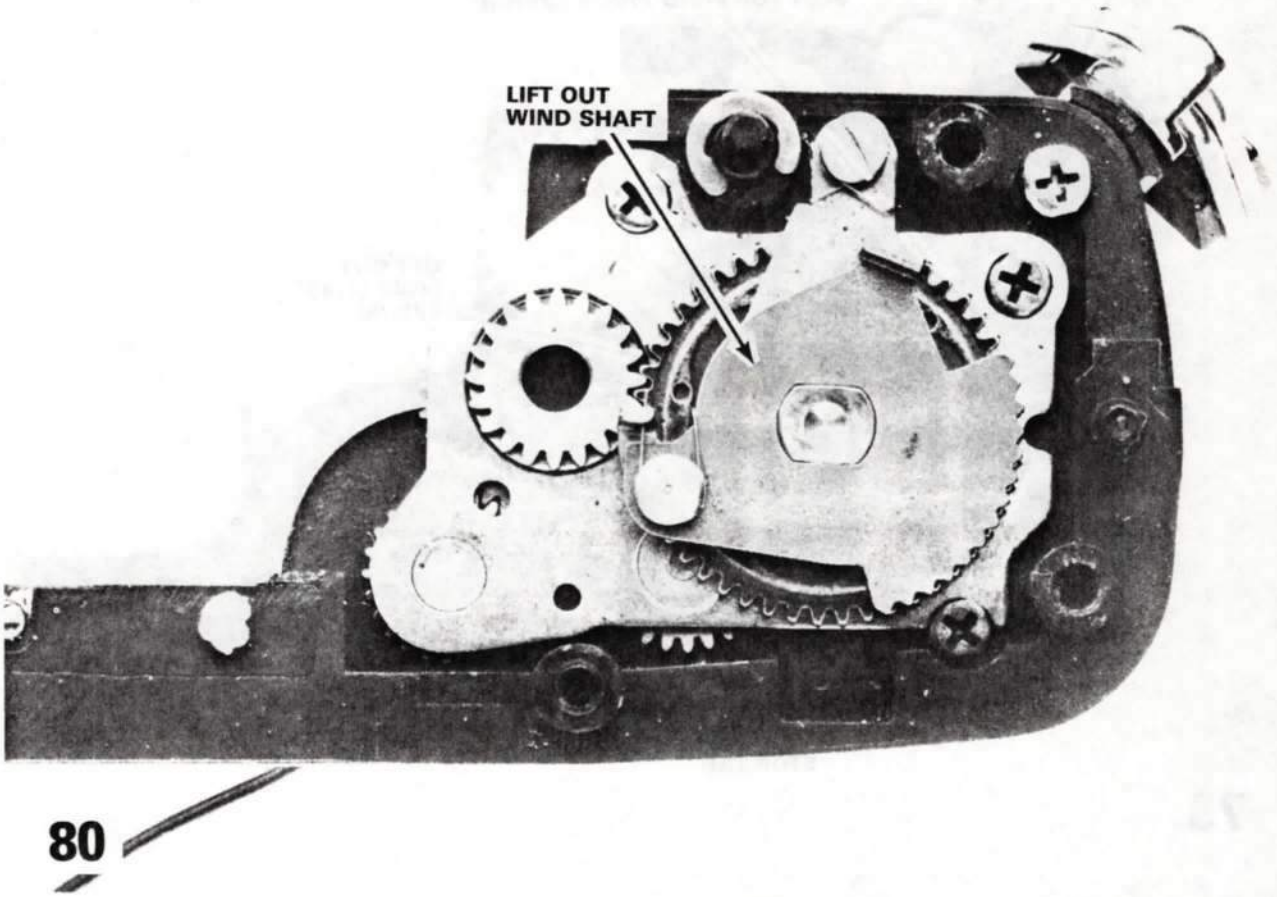


78

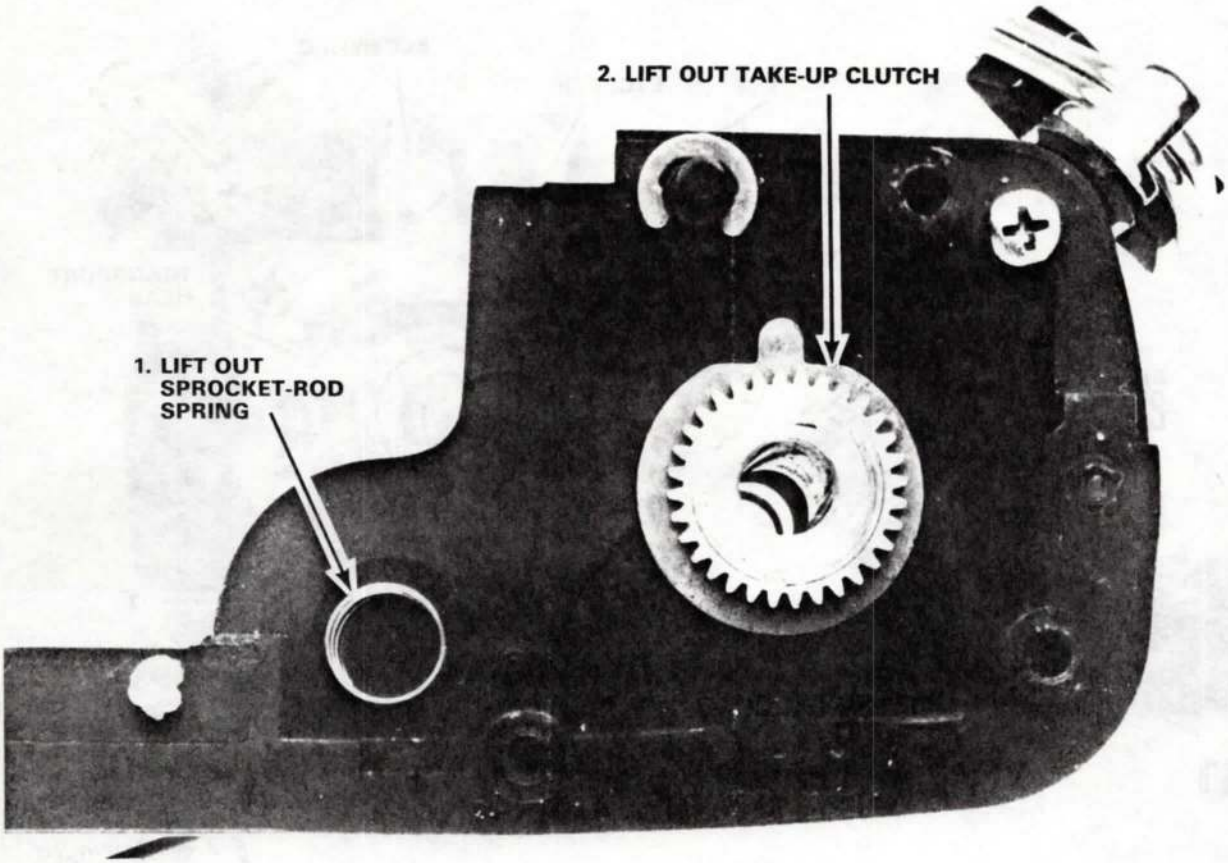


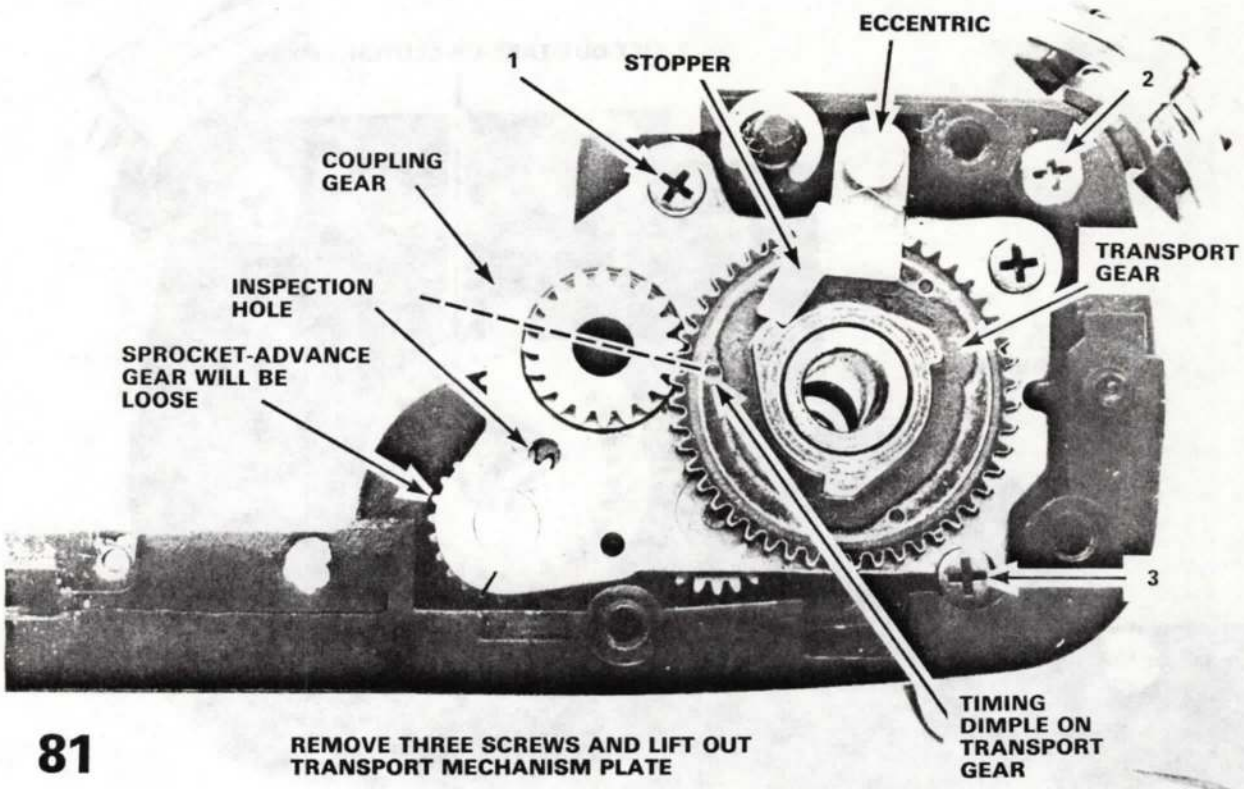
79

On reassembly, seat the slot in the lower wind gear over the end of the wind-shaft spring. Then rotate the lower wind gear in a clockwise direction to apply one turn of initial tension. Lift the lower wind gear slightly until it will pass over the top of the stop tab.



80

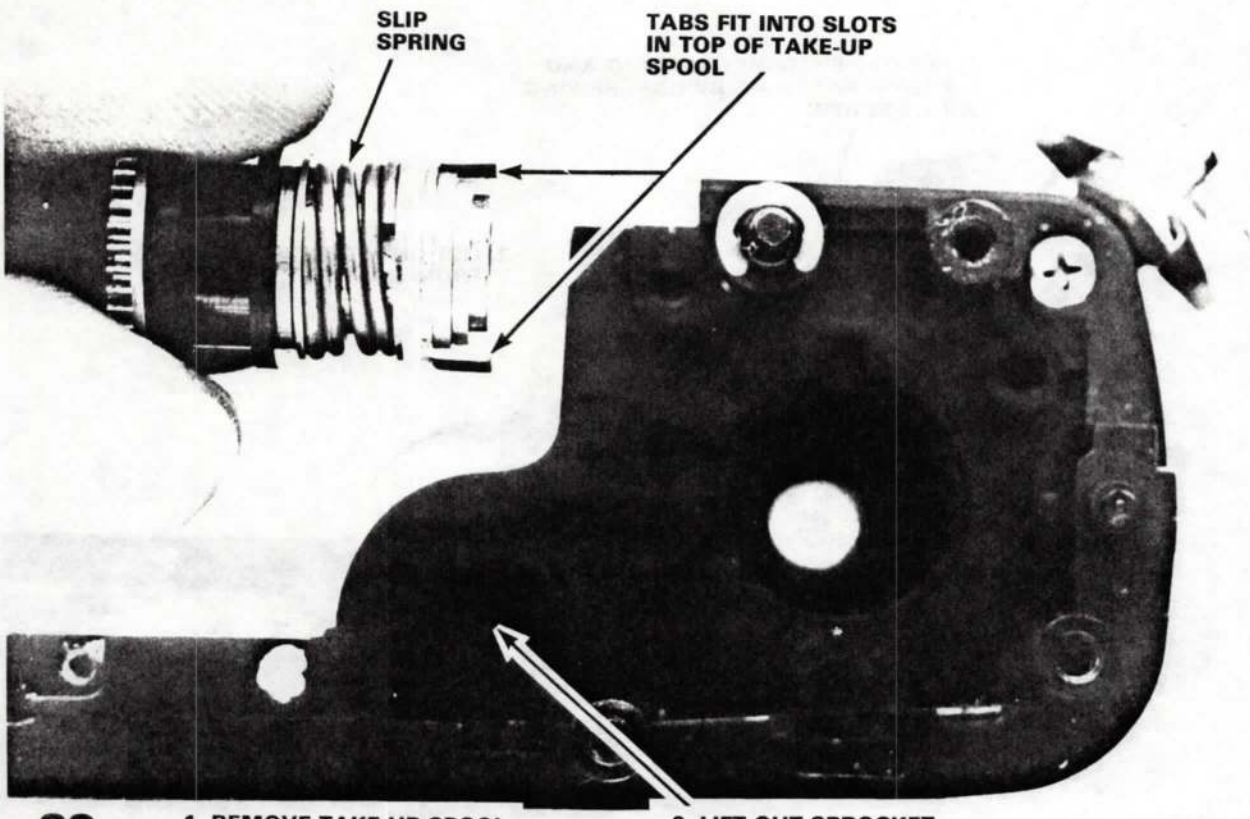

2. LIFT OUT TAKE-UP CLUTCH
1. LIFT OUT SPROCKET-ROD SPRING



81 REMOVE THREE SCREWS AND LIFT OUT TRANSPORT MECHANISM PLATE

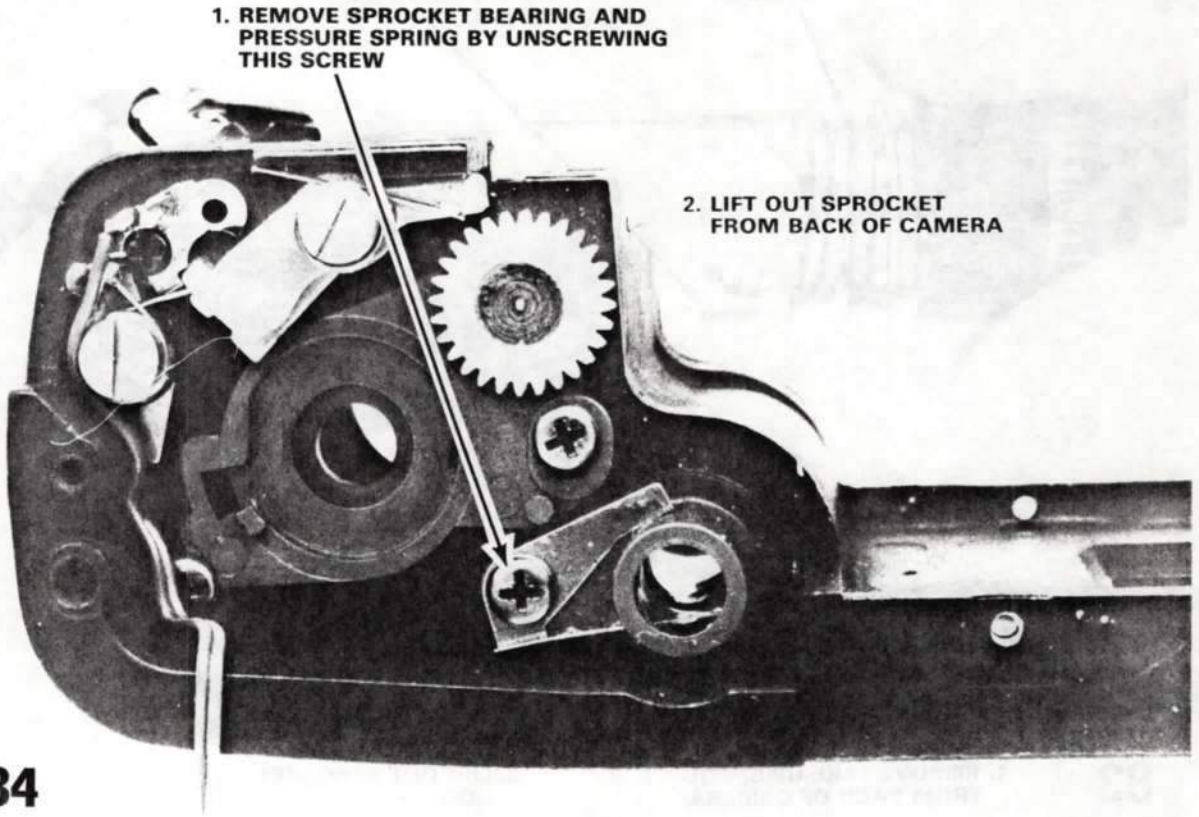
#75 down to transp

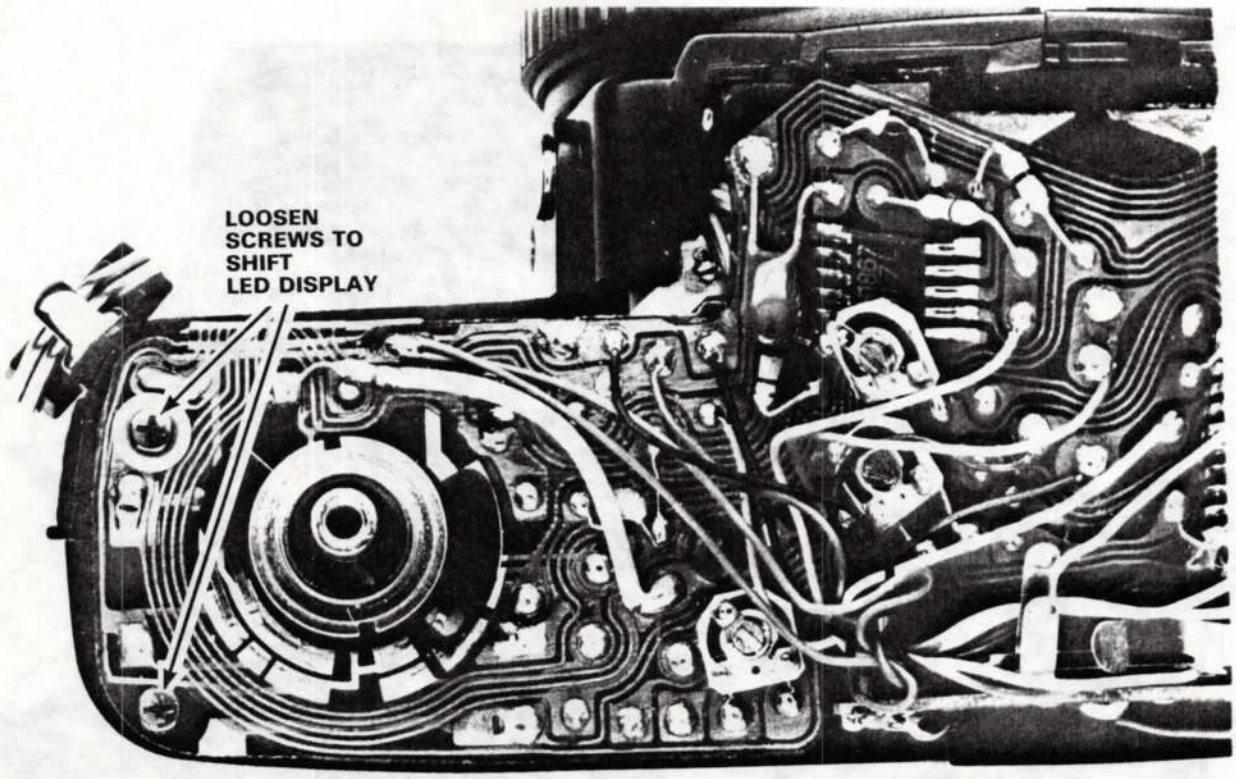
Sproket 6° to the right not facing right at you



83

1. REMOVE TAKE-UP SPOOL FROM BACK OF CAMERA
2. LIFT OUT SPROCKET ROD

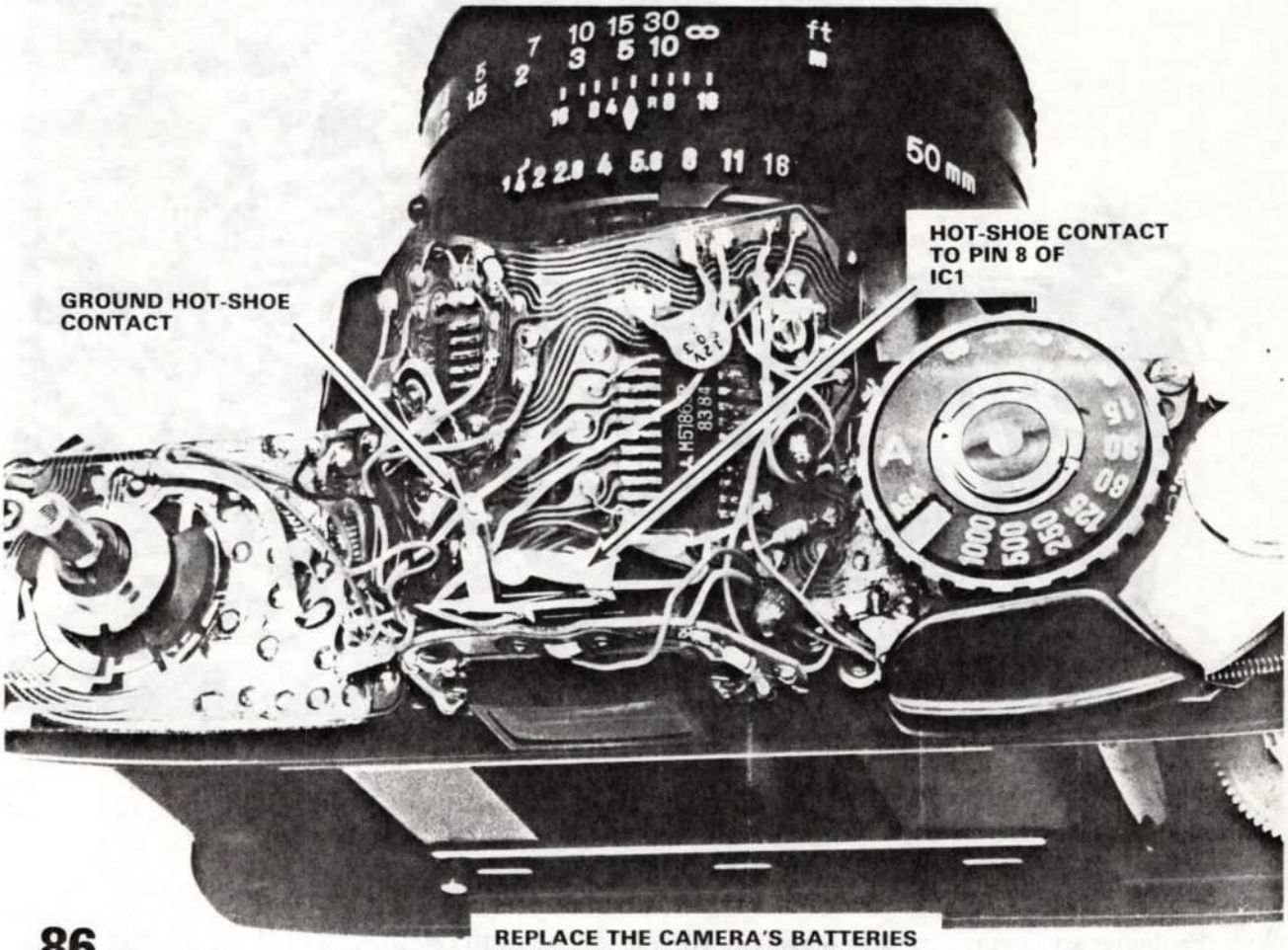

1. REMOVE SPROCKET BEARING AND PRESSURE SPRING BY UNSCREWING THIS SCREW
2. LIFT OUT SPROCKET FROM BACK OF CAMERA



85

Adjustments

With the shutter set to auto, check to make sure you can see each LED clearly and brightly. You can rotate the diaphragm-metering ring to turn on each LED as you're touching the top of the release button. If necessary, loosen the two screws shown here and shift the position of the LED circuit board.



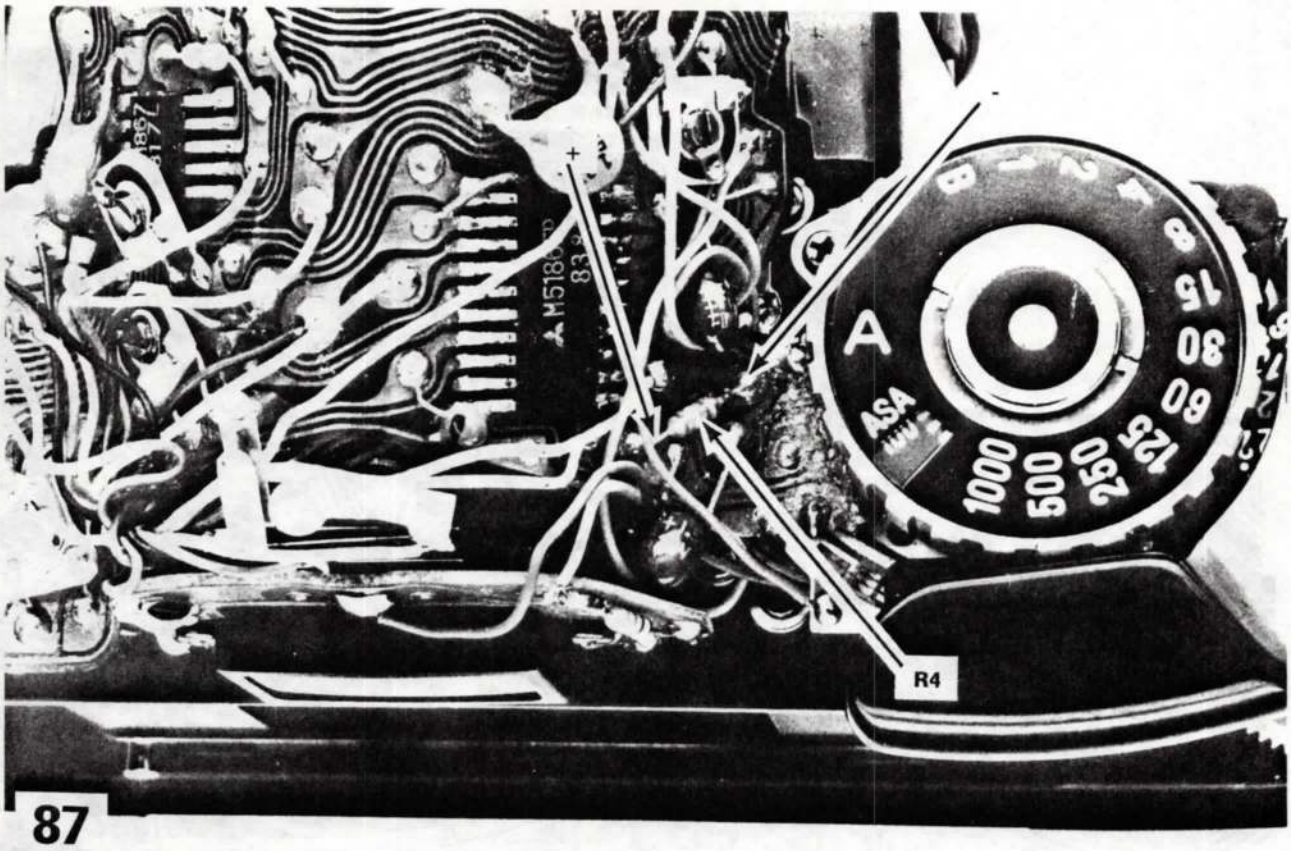
86

REPLACE THE CAMERA'S BATTERIES TO TEST THE FLASH CHANGEOVER

Use a DC power supply to test the flash-changeover action. Set the speed knob to the automatic position, and set the mode switch to the on position. Then connect the negative power-supply lead to the ground hot-shoe contact. Connect the positive power-supply lead to the hot-shoe contact which goes to pin 8 of IC1.

The DC power supply now provides the signal to switch the camera's speed setting and readout. Start with the power supply set to 0 volt. When you touch the top of the release button, the LED display should indicate the shutter-speed setting which the camera will automatically program. Now, slowly increase the power-supply setting. The LED indication should move down, toward the bottom of the focusing screen, until it blanks out entirely at around 1.7V. When you reach a setting of 2V, the "60" LED should turn on and glow steadily.

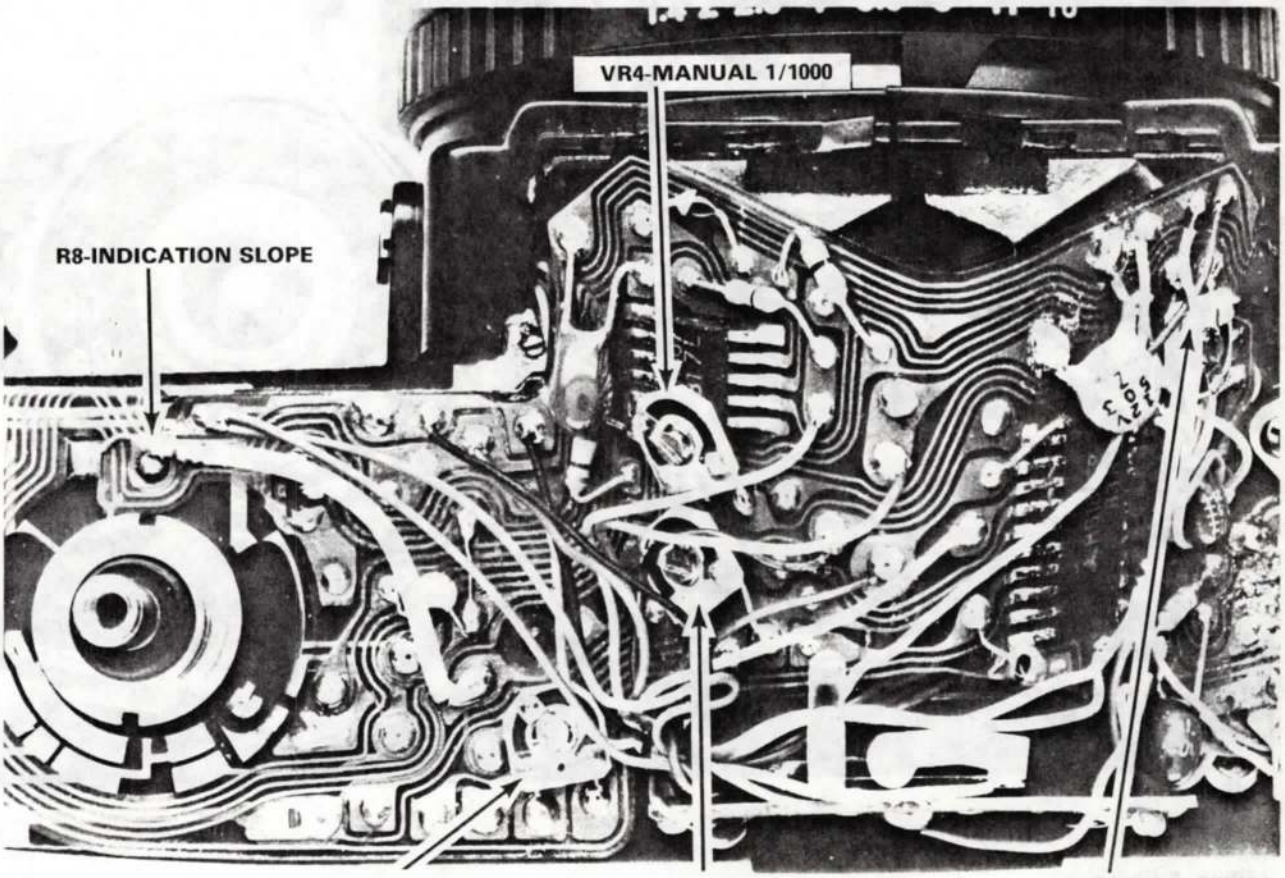
Next, try releasing the shutter. The opening curtain should release, but the closing curtain should remain held until you disconnect one power-supply lead. If the changeover action does not test properly, check the connections between the hot-shoe contacts and the flex circuit.



87

180ma Adjustment

Remove the batteries and connect a DC power supply between the positive battery terminal and ground. Set the power supply to 2.8V. Then partially depress the release button and measure the voltage across resistor R4. You should measure 180mv (0.18V) +2mv. If necessary, change the resistance value of R4 for the proper voltage reading as your first step in adjusting the shutter speeds. For the shutter-speed and readout adjustments, power the camera using the 2.8V DC power supply.


VR4-MANUAL 1/1000
R8-INDICATION SLOPE
VR3-INDICATION 1/30
VR2-AUTO
VR1-MANUAL 1/30

88A

Adjustment Sequence

1. Check curtain-travel time -- 10.7 - 11.3ms across 32mm distance.

2. Auto Speeds -- VR2

   Set: EV10 (f/2.8 light level on Comparalumen or AutoLumen)
   ASA 100
   f/5.6
   Auto

   Cover the top of the camera as you test the automatically controlled exposures. The shutter should now deliver an exposure of 1/30 second within the tolerance range of 32ms to 36ms. Make the adjustment with variable resistor VR2. Turning the wiper of VR2 in a clockwise direction provides a faster shutter speed.

   Next change the light level to EV15 (f/16 light level on the Comparalumen or AutoLumen). The shutter should now deliver 1/1000 second within the range of 0.95ms to 1.7ms.

3. Indication Adjustment -- VR3

   Set: EV11 (f/4 light level on the Comparalumen or AutoLumen)
   ASA100
   f/8
   Auto

   The LED by the "30" calibration should turn on to indicate 1/30 second. If necessary, turn the wiper of VR3 until only the "30" LED turns on. Turning the wiper clockwise moves up the indication.

   Resistor R8 provides a slope adjustment for the indication. You can then adjust the linearity by changing the resistance value of R8.

4. Manually Set Speeds -- VR1 and VR4

   First check the shutter speed at the 1/30-second setting. Adjust variable resistor VR1 until the shutter speed is within the range of 30 - 30ms. Turning the wiper of VR1 in a counterclockwise direction makes the shutter speed faster.

   Next check the 1/1000-second setting. Adjust variable resistor VR4 for an accurate 1/1000 second (ideally, 0.98ms). Turning the wiper in a clockwise direction makes the shutter speed faster.

   Recheck the exposure at 1/30 second. The 1/1000-second adjustment has very little effect at 1/30 second. If you have to readjust 1/30 second, work back and forth between VR1 and VR4 until both 1/30 second and 1/1000 second are correct.

88B

IF OPEN

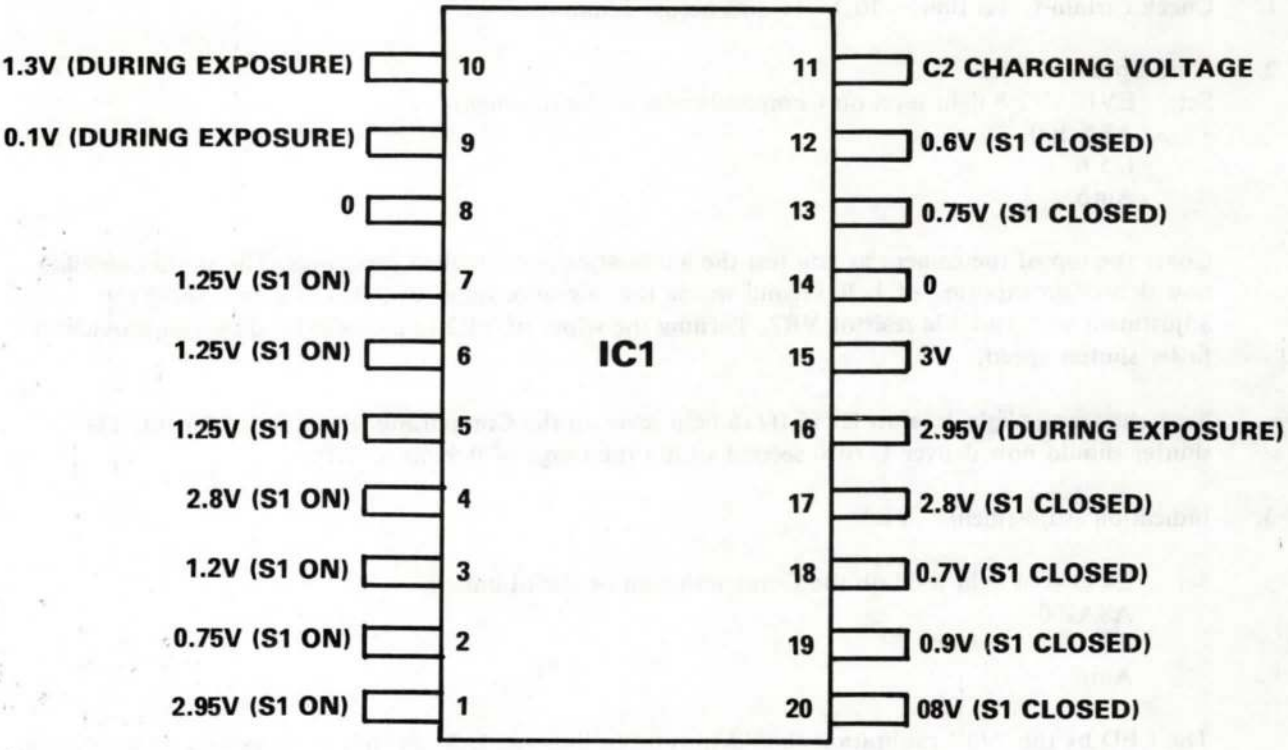
VR1 160 K Shutter hangs open on manual

VR2 15 K No Exposure

VR3 15k overexposure LED Remains on

VR4 ~~15~~ K No Exposure

VOLTAGES AT AUTO



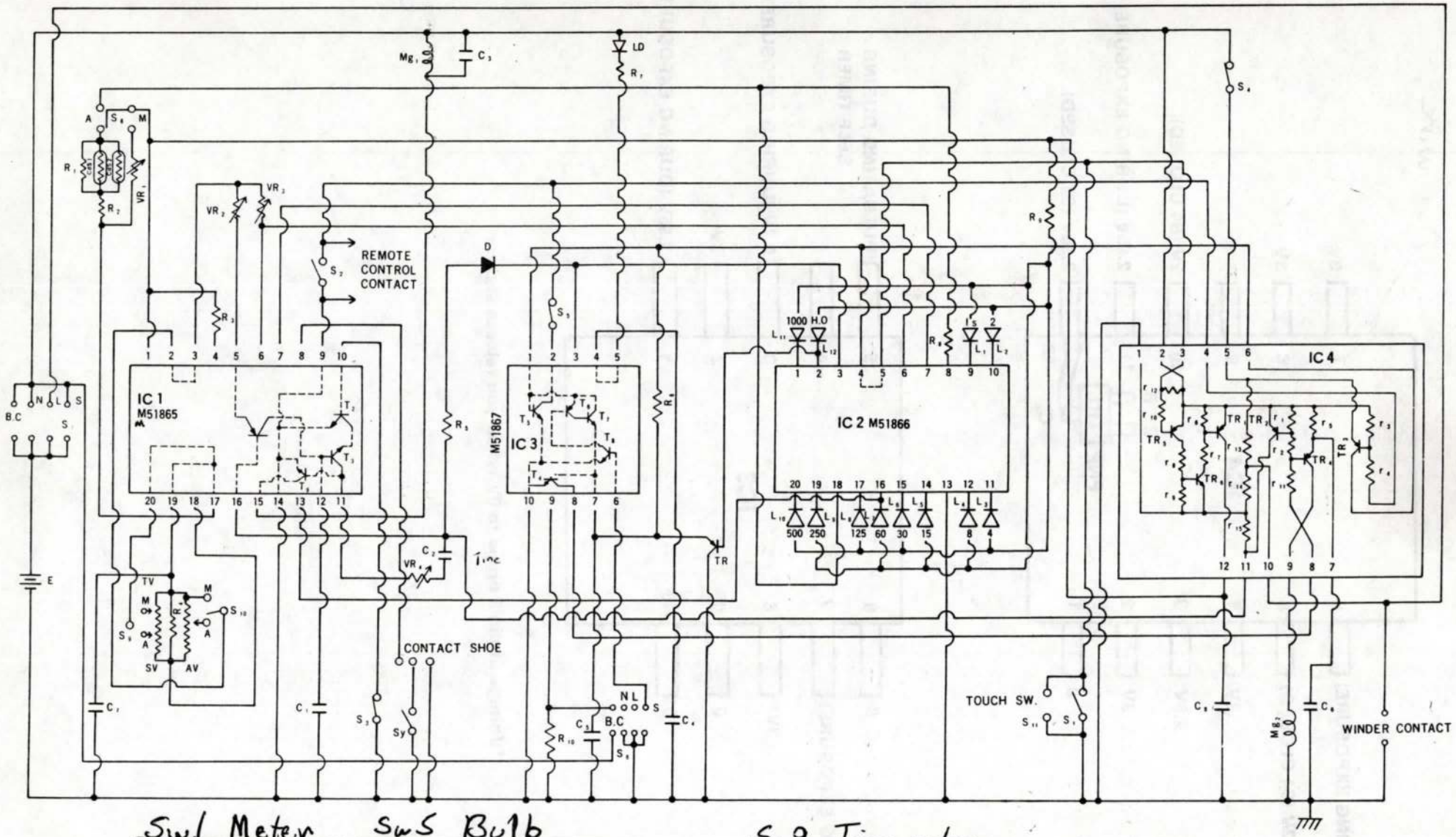
Voltage at pin 19 decreases at manual shutter speeds -- 1/1000 - 0.86V
1/500 - 0.84
1/250 - 0.82

Voltage at pin 13 changes to 1.7V at manual speeds

Voltage at pin 6 changes according to camera settings

89

Pin 3 is the output of the op amp that charges the memory capacitor. The voltage at pin 3 should go more positive for any condition that calls for a faster shutter speed.



Sw1 Meter Sw5 Bulb

Sw2 Release Sw6 Self timer, Battery on

Sw3 Trigger Sw7 Sync

Sw4 Reset Sw8 change over auto manual

Sw9 Time value

Sw10 Aperature value

Sw11 touch

C1. Memory

C2. timing

C3 counter EMF mg 1

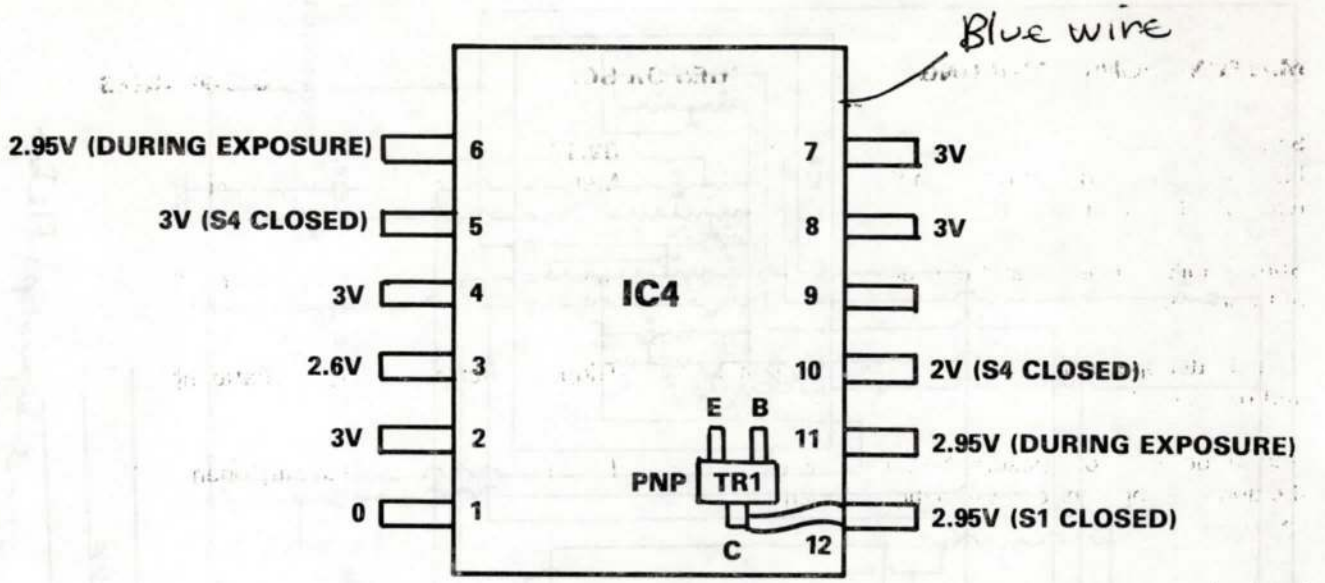
C4 oscillator self timer

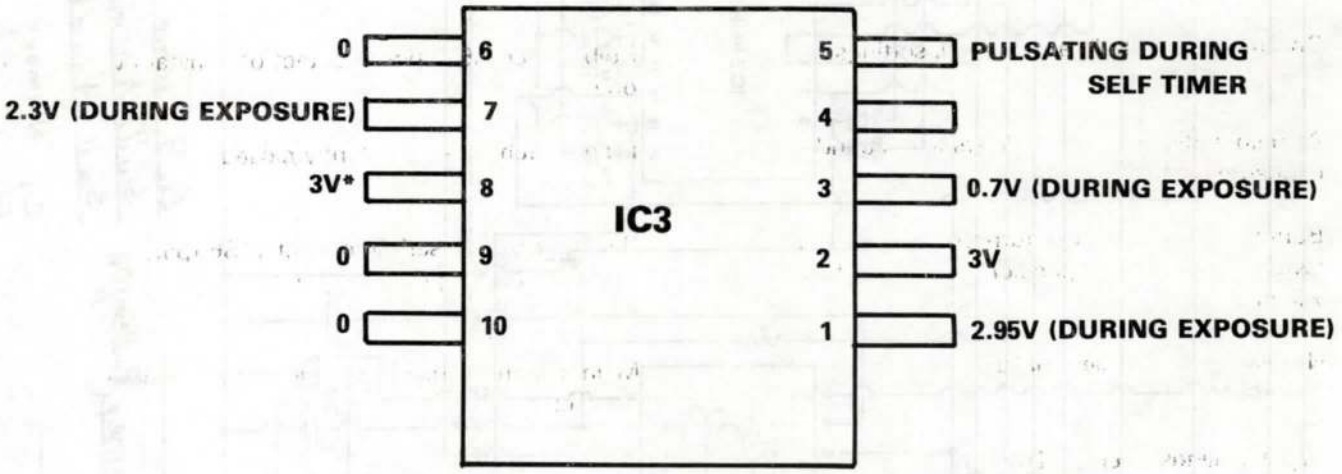
C5 counter EMF mg 2

C6 release

C7 - stabilizer stops flicker

C8





*Voltage at pin 8 drops to 0V when you release shutter

MALFUNCTIONS RESULTING FROM SWITCHES OR SOLDER CONNECTIONS TO SWITCHES

SYMPTOM	SWITCH
LED display fails to turn on when you depress release button part way.	Metering switch S1 -- poor contact
Shutter fails to release, and the self timer will not operate.	Release switch S2 -- poor contact
Fast shutter speeds are etratic, both on automatic and on manual.	Trigger switch S3 -- dirty or chattering
Shutter delivers no exposure; both curtains cross the aperture together on automatic and manual speeds.	Trigger switch S3 -- constantly open
Shutter hangs open on automatic and manual modes, but the LEDs still operate on automatic.	Trigger switch S3 -- constantly closed
Shutter will not release.	Reset switch S4 -- poor contact or constantly open
Shutter delivers bulb action at all settings.	Bulb switch S5 -- poor contact or constantly open
At bulb setting, shutter delivers a 1-second exposure.	Bulb switch S5 -- constantly closed
Battery-test LED fails to turn on when the mode switch is in the B.C. position, and the self timer will not operate.	Battery-test and self-timer switch S6 (part of mode switch) -- poor contact
Nothing operates electronically.	Main switch S7 (part of mode switch) -- poor contact
Shutter hangs open, LED display fails to turn on.	Changeover switch S8 -- poor contact
Shutter won't release on automatic, and over-exposure LED remains on. Manually set speeds all fast.	Changeover switch S10 -- poor contact

INITIAL TROUBLESHOOTING TESTS FOR PROBLEMS NOT CAUSED BY SWITCHES

SYMPTOM	TEST
Shutter hangs open, LED display fails to turn on.	Check for approximately 3V at pin 12 of IC4 as you start depressing the release button. If you aren't getting the voltage, check the metering switch S1 and the IC4 solder connections (page 8).
	Check for a shorted capacitor C7 (page 26).
	Check for poor solder connections at pin 4 and pin 20 of IC1
	Check for an open resistor R3 (page 26).
Shutter hangs open on all modes, under-exposure LED remains on.	Check for a shorted memory capacitor C1 (page 26).
Shutter hangs open, LEDs operate.	Check for a shorted timing capacitor C2 (page 26).
Shutter hangs open on auto, works properly on manual.	Check for an open resistor R2 (page 22).
	Check for poor contact on film-speed brush (page 38).
	Check for open photocells or open in the photocell path, such as poor solder connection at the blue wire or green wire (page 22).
Shutter hangs open on all modes, over-LED always turns on at auto.	Check for poor contact of speed-selector brush (page 39).
Shutter won't release; LEDs operate properly.	Check combination magnet Mg2 (page 8).
	Check release capacitor C6 (page 8).
	Check release-time capacitor C5 (page 54).
Shutter won't release at auto, over-exposure LED remains on.	Check for poor contact of diaphragm resistor AV (page 54).
	Check solder connections to diaphragm-resistor wires (page 26 and page 42).
Shutter delivers no exposure; both curtains cross the aperture together.	Check for an open electromagnet Mg1 (page 26).
	Check for a shorted capacitor C3 (page 26).
LED display fails to turn on; shutter operates properly.	Check for an open resistor R9 (page 54).
	Check the LED display (page 54).
Self-timer LED does not flash at the self-timer function, but the self-timer works properly. The LED turns on during the battery-test function.	Check for a shorted capacitor C4 (page 28).
LED fails to turn on, both on battery-test and self-timer modes. Self timer works properly.	Check LED (page 28).
	Check for an open resistor R7 (page 28).